HEALTH ASPECTS OF PESTICIDES

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ENVIRONMENTAL PROTECTION AGENCY

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HEALTH ASPECTS OF PESTICIDES ABSTRACT BULLETIN is a monthly publication of the Division of Pesticide Community Studies of the Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides on humans. The publication represents a monthly review of more than 500 domestic and foreign journals. Subjects and authors of abstracted articles are cross-referenced in an annual index issue. Reprint requests should be directed to the author of the complete article.

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ERRATA

HAPAB 5(7), July 1972, p. 322:

The citation as originally listed was incorrect. Correction is as follows:

72-1385. Bevenue, A.; Hylin, J. W.; Kelley, T. W. (Hawaii Agricultural Experiment Station, College of Tropical Agriculture, U. of Hawaii, Honolulu, HI). **Pesticide residues in our waters.** *Hawaii Farm Sci. 20(3). 1-3; 1971.* (5 references)

In the quarterly Subject Index: II. Concepts appearing in the March 1972 issue, the position of pages lxxxvii (87) and lxxvii (77) was incorrect and should be reversed.

72-1584. Kintanar, Q. L. (Author address not given). **For a rational approach to the DDT pollution problem.** *Acta Med. Philipp. 6(Ser 2)(4): 171-172; 1970.*

DDT has been found to be persistent and hazardous to wildlife, although not obviously toxic to man. The author therefore recommends its use in the Philippines be limited to those situations where no substitutes are available, such as in the case of the Malaria Eradication Program. Other insecticides, having fewer potential hazards, are recommended for household and agricultural use.

72-1585. Kurstak, E. (Dept. of Microbiology and Immunology, U. of Montreal, Montreal, Quebec, Canada). **Repercussions eventuelles de la lutte microbiologique sur les vertebres. Cas des insecticides biologiques a base de virus. [Possible repercussions of microbiological control measures on vertebrates. Case of biological insecticides based on viruses.]** *Ann. Parasitol. Hum. Comp. 46(3): 277-288; 1971.* (43 references) (French)

Viruses which attack insects have been studied for use in agriculture and some preparations containing such viruses have been made commercially available. However, investigators at the University of Tokyo demonstrated that the DNA of the nuclear polyhedrosis virus of *Bombyx mori* induces the production of viruses and polyhedra in cultured amniotic FL cells of human origin. Reinoculation of these viruses, grown in human cell cultures, into the insects produced the typical disease. A working group from the University of Montreal reported that the densonucleosis virus, extracted from larvae of *Galleria mellonella*, is capable of infecting mouse L cells *in vitro*, and can destroy about 30% of the infected cells. The same virus appears to be carcinogenic for mouse and hamster cells cultivated *in vitro*. Soviet researchers reported that the virus which causes paralysis in bees can be propagated in chick embryos. Prior to large-scale use of viruses as biological control weapons, studies are needed to reduce the likelihood of infection in desirable species.

72-1586. Anonymous. **Pesticides and the environment.** *Bull. Entomol. Soc. Amer. 17(1): 1-16; 1971.*

Recognizing the need for an objective appraisal of the role of insecticides in the environment, the Entomological Society of Canada analyzed the problem and put forth some short- and long-term proposals. They stated that Man has placed excessive demands on his environment and that he must reduce his numbers and consumption in the future so that progressive deterioration of the environment will not occur. Regulation of insecticide application and orderly reduction of the amounts of chemicals used are considered short-term objectives.

72-1587. Anonymous. **Chemicals with sex appeal trap insects.** *Chem. Week 110(22): 53; 1972.*

Recent research efforts on the use of sex pheromones for insect control indicate that about 30 of the known attractants have been isolated. An adhesive trap, containing the female attractant of the gypsy moth, was one of the first commercial uses of this phenomenon, and other methods of control using lures have been tested. Along with their use in trapping insects, they can prevent environmental damage by helping to establish efficient spraying programs.

72-1588. Tolle, A.; Heeschen, W.; Bluethgen, A. (Author address not given). **Zur Analytik und Bedeutung von Rueckstanden chlorhaltiger Insektizide und Fasziolizide. [Analysis and significance of residues of chlorine-containing insecticides and fasciolicides.]** *Deut. Milchwirt. (Hildesheim) 23(10): 329-330; 1972.* (German)

The use of pesticides, particularly chlorinated hydrocarbons, in food production has now become a socioeconomic problem as well as a scientific one. Integrated pest control methods without chlorinated hydrocarbons have been used in Germany and the use of the latter compounds has been greatly restricted. However, residues still occur in foods due to the persistence of the organochlorines. Pesticide residues in milk stem mainly from animal feed, and under average German conditions, contribute between 0.18% (lindane) and 33% (aldrin + dieldrin) to the acceptable daily intake in the diet. In both Germany and the U.S., about 50% of the dietary DDT is obtained from foods of animal origin. This level of contamination does not seem to represent a threat to human health, but the comparatively high dieldrin + aldrin levels represent a latent threat, especially to children.

72-1589. Versino, B. (Ispra Establishment, Joint Research Centre). **Pesticides – a problem for present-day society.** *Euro-Spectra 10(1): 2-10; 1971.*

A discussion is presented concerning the universal and persistent nature of some pesticides, their levels in man and the natural environment in relation to acute and long range toxicity, and the efforts of the European community to cope with the problem. It is concluded that the need for pest control will persist, and that regulations must be adapted as less toxic and persistent substances are introduced and as more knowledge is gained. Also, more rational, although less economical means of control must be pursued before an irreversible situation develops. Until specific controls such as attractants and growth hormones are useable, integrated pest control must be employed. This would involve planting pest-resistant seed, applying pesticides only at effective times, releasing sterile insects and introducing predators.

72-1590. Anonymous. **Viruses as pest control weapon.** *Food Technol. Aust. 24(4): 177; 1972.*

Insect control through the use of specific viruses was discussed at a meeting of FAO's Working Party on Pest Resistance to Pesticides. Five of the 300 viruses known to kill insects have been produced industrially, only 1 of which has been cleared for limited U.S. field use. Development of such viruses is expensive; there is no patent protection and each is effective against only a few insects. Priorities for the Working Party include developing better tests to accelerate the clearance of viruses for field use and compiling names of key pests for which viruses are required.

72-1591. Bayon, N. (Author address not given). **Pesticides: operation verite. [Pesticides: operation truth.]** *Gaz. Med. France 78(20): 3283-3284; 1971.* (French)

To receive authorization for use by the French Ministry of Agriculture, a pesticide must be subjected to exhaustive toxicological testing. This includes: acute oral LD50 in rats, mice, rabbits, and dogs; a 14-day subacute toxicity study; dermal toxicity and effects on mucous membranes, the latter by intraocular administration in guinea pigs; and in the case of pulverized preparations, inhalation toxicity. A 3-mo chronic toxicity test must then be performed to determine the minimum toxic dose. If no anomalies are found at the conclusion of this test, chronic studies are continued for a year to ascertain the residue levels in various organs. If pesticide accumulation is found, reversibility studies are conducted for another year to determine the acceptable daily intake. Teratogenic effects are also studied on three successive generations. The cost of a complete pesticide test ranges from 5 to 20 million francs.

72-1592. Papworth, D. S.; Rudge, A. J. B. (Pest Infestation Control Lab., Ministry of Agriculture, Fisheries and Food, Tolworth, Surrey, England). **The quantities of pesticides used for the protection of stored grain and the control of harmful mammals on British farms.** *Int. Pest Contr. 13(6): 17-21; 1971.* (10 references)

In a survey of farms in England and Wales it was found that 3,300,000 tons of wheat and barley were treated with insecticides while in storage. This amount of cereal represented 40% of the total home grown stock in storage for 1966. In general, recommended procedures for using the insecticides were followed. Malathion was sometimes used at only 30 to 70% of the recommended dosage. Misuse of pesticides included use of dieldrin, sheep dip, and dimethoate for grain protection, and ANTU for rodent control. Rodenticides, mainly warfarin and norbormide, were used on 201 out of 203 of the farms surveyed.

72-1593. Wilber, C. G. (Dept. of Zoology, Colorado State U., Fort Collins, CO). **Polluted water—a challenge to forensic biology.** *J. Forensic Sci. 16(3): 251-268; 1971.* (10 references)

In an address to the American Academy of Forensic Scientists, the author stated that scientists skilled in courtroom litigation should become involved in cases dealing with environmental contamination. More evidence which will stand up in court is going to be needed in the field of pollution. An example is the need to evaluate the long-term detrimental effect of mercury, which is converted to methyl mercury and concentrated in the food chain. Information is too sparse and statements by academic scientists too vague in the field of pesticides for any reasonable legal attack.

72-1594. Anonymous. **Dossier du dichlorodiphenyltrichloroethane. [The file on dichlorodiphenyltrichloroethane.]** *Phytoma 235: 31-36; 1972.* (French)

The "file on DDT", started in previous issues of *Phytoma* (see Abstract No. 72-0439) has been brought up-to-date. Despite announcements in French publications in 1970 that DDT was to be banned in West Germany, a total ban never occurred; rather, the use of DDT was restricted to those situations in which no substitute was available, e.g., against certain forest pests. The legislation regarding DDT resembled that established for other pesticides, which permitted their use when essentially safe and indispensable. World journalistic opinions supporting WHO's statements in favor of continued DDT use for public health purposes are quoted. One frequently raised objection concerning DDT is its presumed carcinogenicity. However, two publications released late in 1971 have indicated that DDT and its derivatives may have an anticarcinogenic effect (cancer-preventing or cancer-destroying) under some circumstances. Portions of the address presented by Norman Borlaug at the 1971 annual meeting of the FAO in Rome are reprinted. Finally, some instances of confusion between pesticide residues and organochlorine substances obtained from plastics are documented.

72-1595. Watts, B. B. (Registrar, Agricultural Chemicals Board, Wellington, New Zealand). **Common names for pesticides.** *Proc. N. Z. Weed Pest Contr. Conf. 24: 148-150; 1971.*

Common names for pesticides are needed in scientific literature, legislation, and trade, and international agreement on them is desirable. New Zealand's Agricultural Chemicals Board takes for consideration names from the British Standards Institution and the International Organization for Standardization. The board considers it essential that names be short and easily pronounceable, and does not insist that they have a direct relation to the chemistry of the product.

72-1596. Reynoso Zuniga, E.; Mendoza Hernandez, P.; Martinez Reyes, C.; Rivas Llamas, R. (Servicio de Hematologia, Hospital General, Centro Medico "La Raza", Mexico.) **Efectos nocivos de los insecticidas. [Harmful effects of insecticides.]** *Rev. Med. Mex. 9(3): 222-230; 1970.* (44 references) (Spanish)

Insecticides in current usage are discussed in terms of developmental history, toxicology and pharmacology, chemistry, poisoning hazard, insect resistance, and environmental contamination. The beneficial effects of insecticides in raising food production and eradicating disease are noted. However, the period of unrestricted use, following their discovery has inevitably been followed by recognition of their harmful effects. Poisoning in humans is generally due to carelessness in following instructions for use. The bases for correct diagnosis of pesticide poisoning include a history of exposure to the product and the presence of characteristic signs and symptoms in the patient. Hematologic anomalies such as pancytopenia may occur as the result of chronic pesticide exposure. It is important to remove the patient from situations of contact with pesticides, since renewed exposure for those with depleted defense mechanisms has resulted in death.

72-1597. Granhall, I. (Author address not given). **De kemiska vaextskyddsmedlens roll pa gott och ont. [Chemical plant protection agents: advantages and disadvantages.]** *Sver. Utsadesfoeren. Tidskr. 81(5): 316-325; 1971.* (18 references) (Swedish)

While the advantages of synthetic pesticides were most widely publicized in the first few years after their introduction, their side effects and shortcomings have recently gained attention. The Swedish Poisons and Pesticides Board has established hazard categories for individual pesticides. These are summarized, along with the LD50 value, danger to bees, and required waiting time before harvesting. Much attention is now being devoted to integrated pest control methods, especially in four areas where chemical pest control has displayed inadequacies. The first area includes pests for which effective chemical controls have not yet been discovered, e.g., soil-borne fungi, viruses, and nematodes. The second area, exemplified by some insect species, is that in which resistance to chemical pesticides is common and difficult to combat. In the third category, effective chemicals are available, but they are dangerous or extremely expensive (e.g., seed-borne fungi, weevils). The fourth category includes those pests which require frequently repeated treatments and are therefore very expensive to control. Plant breeding might be employed to increase resistance to these types of pests.

72-1598. Velle, W. (Norges Veterinaerhogskole, P. O. Boks 8146, Oslo-Dep, Oslo 1, Norway). **Litt om hvordan egget blir til, og om pesticiders innflytelse pa reproduksjonen hos fugl. [Egg formation and influence of pesticides on the reproduction of birds.]** *Tidsskr. Norske Laegeforen. 91(32): 2299-2302; 1971.* (15 references) (Norwegian)

The mechanism of egg formation and the effects of pesticides on bird reproduction is discussed. The increased estrogen secretion from the ovary during the ovulation period has a considerable effect on several metabolic processes, resulting in phosvitin formation, increased blood calcium level and medullary bone formation. Calcium required for eggshell formation comes from the blood, while carbonate is formed from bicarbonate by shell-gland carbonic anhydrase. Reproduction of birds is affected by pesticides by way of estrogens, blood calcium, gonadotropins and shell-gland carbonic anhydrase. After intense use of pesticides (DDT, dieldrin, chlordane, DDE, and polychlorinated biphenyls) in certain areas the wild bird population decreased considerably. There were also increases in liver steroid hydroxylase activity in birds treated with such pesticides; this inhibited ovulation, increased embryonal mortality, and caused thin eggshells. The low blood estrogen level due to intensified metabolism in the liver reduced blood calcium level. Specific inhibition of the shell-gland carbonic anhydrase activity resulted from pesticides of the DDT–DDE type only.

72-1599. Sinclair, D. (Southwoods Hall, Thirsk, Yorkshire, England). **Toxic sheep dips.** *Vet. Rec. 88(3): 82; 1971.*

In a Letter-to-the-Editor, the suggestion that manufacturers of toxic sheep dip be made to produce detoxicants for their products was reiterated. It was based on the idea that users and producers of pollutants should be made legally responsible for eliminating the pollution hazard.

72-1600. Leib, E. (Peter-Ruster Str. 4, Bonn 53, Germany). **Im Dienste des Umweltschutzes. [At the service of environmental protection.]** *Anz. Schaedlingsk. Pflanzenschutz. 45(1): 10-13; 1972.* (German)

The continuing involvement of German agricultural chemicals inspection stations in Germany with environmental protection is exemplified by the amendments passed in July of 1971, to the Plant Protection Law of May 10, 1968. The major amendment states that adjuvants and additives in pesticide formulations fall fully within the provisions of the Plant Protection Law, and must be subjected to full testing, registration and labeling. A second provision of this amendment pertains to commercial application of pesticides, specifying more clearly the qualifications for pest-control operators. A new ordinance regarding permission for pesticide use even applies to pesticides considered acceptable under the 1968 plant protection law and which were subsequently found to have harmful effects. Limitations were placed on the use of aldrin, DDT, endrin, heptachlor, maleic anhydride and mercury compounds. The use of

lindane on stored grain and processed grain products was prohibited, as was the use of toxaphene in vegetable growing. Root vegetables may not be planted in soils previously treated with toxaphene for 18 months, and other vegetables for 6 months.

72-1601. Huang, J. C. (U. of Missouri, Rolla, MO). **Pesticides in water – effects on human health.** *J. Environ. Health 34(5): 501-508; 1972.* (27 references)

There are several routes by which pesticides in the water supply can affect man. Trace quantities of organochlorine pesticides are routinely found in more than half of the river specimens examined. The degree to which these can be removed by water treatment depends on the method used, but is generally not very great. At the 1 ppb level, drinking water would account for about 5% of the dietary intake of organochlorines. Fish represent another route whereby pesticides are transferred from water to man. Fish are known to concentrate organochlorine residues. The third route is that of dermal absorption, resulting from direct contact during swimming and other water sports. At present, the amount of pesticides in drinking water does not seem to pose an acute threat to human health. However, the consequences of long-term pesticide ingestion are not yet known.

72-1602. Lisella, F. S.; Long, K. R.; Scott, H. G. (Div. of Pesticide Community Studies, Office of Pesticides Programs, Environmental Protection Agency, Chamblee, GA 30341). **Health aspects of arsenicals in the environment.** *J. Environ. Health 34(5): 511-518; 1972.* (25 references)

Arsenic has been known as both a poison and a chemotherapeutic agent since antiquity. Within the past two centuries, insecticidal, rodenticidal, fungicidal and herbicidal uses have also been discovered for various arsenic compounds. The multiplicity of arsenic-containing compounds and their uses means that arsenic can enter the environment and the human body from many sources. In the U.S. the use of arsenicals as insecticides has declined, while the quantities used as herbicides have increased. In acute or chronic arsenic poisoning, gastrointestinal disturbances or nervous system manifestations may dominate the picture. Tolerances for arsenic in various foodstuffs range from a zero tolerance for arsenic in the Soviet Union to 4 ppm of arsenic in U.S. cotton seed meal. Wine and cider prepared from arsenic-treated fruit may contain arsenic residues, but these are generally removed during processing. The question of carcinogenicity of arsenic and its compounds remains controversial; however, the FDA does not consider the quantities of arsenic remaining in treated foods to be hazardous.

72-1603. Coon, J. M. (Dept. of Pharmacology, Thomas Jefferson U., Philadelphia, PA 19103). **Food toxicology: safety of food additives.** *Modern Medicine (Chicago) 38(24): 103-108; 1970.*

Concern over the presence of synthetic chemicals in foods should be balanced by an awareness of their significance in overall food composition. Natural components present in foods have been accepted as safe, not on the basis of scientific tests, but on the absence of proven harmful effects. The protocols for evaluating safety of food additives have become progressively more rigorous within the past decade. A battery of tests is required to determine the safe dietary level of any substance, including pesticides, which may remain in food products after use. The multiplicity of food additives and pesticides used today may provide a kind of "safety in numbers"; the availability of a variety of substances for a given purpose means that the use of any one will probably not become excessive. Antagonistic interactions between chemicals present in the body also occur: for example, DDT has been shown to promote the production of enzymes which detoxify other substances, including some organophosphate insecticides, such as parathion.

72-1604. Herfs, W. (Biologische Bundesanstalt, Laboratorium fuer Zoologische Mittelpruefung, Braunschweig, Germany). **Die Auswirkungen des Pflanzenschutzgesetzes der Bundesrepublik Deutschland auf die amtliche Pflanzenschutzmittel-Pruefung nach einjaehriger Erfahrung. [The effects of the West German plant protection law on the official testing of plant protection agents after one year of experience.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 23(2): 17-19; 1972.* (6 references) (German)

The registration of agricultural pesticides for use in West Germany is governed by the Plant Protection Law of May 10, 1968. Since this law has come into force, the workload of the regional pesticide test stations and of the Federal Biological Institution (which coordinates their efforts) has increased greatly. Not only is the testing of all new pesticides now obligatory, but each of these pesticides must be tested for safety in all of its recommended areas of use. Some delay in the approval of new preparations is anticipated, since not all of the required procedures have been completely worked out. The costs for the required testing begin with an application processing charge of 100 DM (West German marks); then include 400-1200 DM for physico-chemical testing; 300-2000 DM for biological testing at each of the three to seven test laboratories, depending on intended areas of application; possibly an additional 150-700 DM at each station for bee safety testing; and 1500-5000 DM for toxicologic and residue testing. Supplementary efficacy testing or test data may be ordered at the discretion of the registration committee, and tests for threats to useful arthropods, phytotoxicity, and organoleptic

qualities are under development. Finally, the packaging and labeling must be approved before the preparation is released for sale.

72-1605. Motas, C. (Author address not given). **Pesticidele. Influenta lor asupra animalelor si asupra omului. Poluarea apelor. [Pesticides. Their effects on animals and man. Water pollution aspects.]** *Ocrotirea Nat. 14(1): 21-33; 1970.* (41 references) (Rumanian)

Persistence and lack of well defined target specificity constitute the main hazards in pesticide usage. Organomercurials can lead to the development of mercury-resistant species, requiring 100 or 1000 times the usual dose for extermination. Organochlorines such as DDT may undergo worldwide circulation processes. Fish in polluted waters may accumulate large amounts of DDT in their fatty tissues and be devoured by ichthyophagous birds; DDT residues can be found in Antarctic penguins and certain birds eating penguin eggs. Aldrin, dieldrin, heptachlor and arsenicals, which had been removed from the market in Great Britain and Poland, produced considerable damage to wildlife in certain regions of Rumania. Organophosphates of the parathion type should be replaced by malathion type which are 2000 times less harmful. Aircraft spraying should be banned to reduce air pollution from pesticides. There is a need for expert handling of pesticides and for developing biological controls which will minimize present ecological hazards.

72-1606. Wickstroem, G. (Inst. of Occupational Health, Helsinki, Finland). **Arsenic in the ecosystem of man.** *Work-Environ. Health 9(1): 2-8; 1972.* (43 references)

The sources and effects of arsenic in the environment are reviewed. Arsenic occurs naturally and at various levels in drinking water, soil, and foodstuffs. Additional arsenic contamination is introduced into soil, air and water by the burning of coal and the smelting of metals. The use of arsenic in rodenticides, insecticides, fungicides, preservatives, sheep dips, dyes, alloys, and drugs results in greater occupational exposure for some industrial workers. Plants and animals accumulate arsenic to various degrees upon exposure; in man, arsenic appears to be excreted mainly by the kidneys, and accumulated arsenic in hair, nails and skin is gradually shed. Elevated incidences of cancer were reported in several studies in vinedressers applying arsenical fungicides. Keratosis was found universally among these workers, and skin and lung cancers were very frequent. However, laboratory experiments with arsenic failed to yield the results anticipated on the basis of epidemiologic data in man.

72-1607. Anonymous. **Ban expected on PCB use.** *Pap. Process. 8(7): 36; 1972.*

A Federal government task force, composed of representatives of FDA, EPA and USDA, has recommended that all current uses of PCB (polychlorinated biphenyls) be discontinued, except use in electrical capacitors and transformers. The recommendation was based on the conclusion that current PCB levels do not represent an imminent threat to health, but the effects of long-term exposure are largely unknown. FDA has proposed regulations which will restrict the PCB content of food packaging materials to 5 ppm, along with measures for preventing accidental contamination of foods. EPA intends to limit the discharge of PCB-contaminated industrial effluents so that PCB levels in waterways remain below 0.1 ppb. Packaging industry representatives have requested additional data from the government on PCB migration into foods and on PCB levels found in a national food and packaging survey, to assist the industry in complying with the proposed regulations.

72-1608. Anonymous. **A close look at TCDD.** *Agr. Res. 20(4): 8-10; 1971.*

Following the discovery that tetrachloro-dibenzo-*p*-dioxin (TCDD) contamination was probably responsible for the mutagenicity of commercial 2,4,5-T samples, an intensive study of TCDD was started by the Agricultural Research Service, Beltsville, Maryland. The results of this study program were presented during the review of the herbicidal use of 2,4,5-T. The research team concluded that TCDD is formed only when certain temperatures are exceeded in the manufacturing process, not biosynthetically or in any other manner. The preventability of TCDD formation was confirmed by failure to find more than 0.5 ppm of TCDD in any 2,4,5-T sample manufactured after April 1970, when the necessary precautions had been published. TCDD was immobile in all soils studied, and was not absorbed or translocated by plants except at extremely high treatment levels. About half of the TCDD applied to leaf surfaces is washed off by a rainfall occurring 2 hours after application. Photochemical degradation of TCDD on soil surfaces takes place slowly.

72-1609. Katz, A. (Mass. Institute of Technology, Lab. for Nuclear Science, Cambridge, MA). **Mercury pollution: the making of an environmental crisis.** *Crit. Rev. Environ. Contr. 2(4): 517-534; 1972.* (54 references)

In reviewing the problem of mercury pollution, it seems that the contribution of pesticides (e.g., methylmercury) to environmental levels of mercury will be easier to deal with than that produced by industrial effluent or widely distributed mercury sources, such as fossil fuel burning. Unlike inorganic mercury, methylmercury penetrates the placenta and the blood-brain barrier, is removed very slowly from the body, and causes irreversible damage. Birds have been most seri-

ously affected by the ingestion of applied methylmercury in the form of seed dressing. However, conversion of inorganic mercury and organic mercury compounds, such as phenylmercury, to methylmercury occurs under a variety of conditions in nature; this allows aquatic and other mercury to enter the food chain as a highly toxic material. Elimination of mercurial pesticides from agricultural and other uses is suggested as a solution to the problem.

72-1610. Raghavan, N. G. S.; Wattal, B. L.; Das, M.; Singh, N. N. (National Inst. of Communicable Diseases, Delhi, India). **Concept, scope and feasibility of integrated pest control against arthropods of public health importance.** *J. Commun. Dis. 2(1-4): 7-15; 1970.* (36 references)

Unlike other pests, arthropods of public health importance share man's immediate environment and depend on bloodfeed for oviposition and/or survival. Although residual synthetic insecticides revolutionized the concept of pest control, the problems of resistance and destruction of non-target organisms soon became apparent. Integrated pest control was then advocated. Genetic manipulation of pest populations appeared to be a promising part of this type of control but its impact on the ecosystem has not yet been determined. One of the most important aspects of integrated control is environmental sanitation, brought about by public education. A survey of control methods used for mosquitoes, houseflies, fleas and ticks and mites illustrates the many problems that remain to be solved in this field.

72-1611. Raghavan, N. G. S.; Singh, N. N.; Das, M.; Wattal, B. L. (National Inst. of Communicable Diseases, Delhi, India). **The building blocks for integrated pest-control programme in public health.** *J. Commun. Dis. 2(1-4): 16-24; 1970.* (15 references)

Control measures available for an integrated pest control program are discussed and include environmental sanitation, chemical control and genetic control. Landscape, defined over altitude, latitude, floral cluster, and hydrolic and climatic conditions, is considered the ecological frame of the population. Information on population size, status and key factors maintaining them is essential for utilization of adverse natural forces within the integrated control design. Genetic resources of the population affect development of resistance and ability to survive under adverse conditions. The efficiency of each individual control measure can be maximized with a knowledge of hunger and sex drives and resting and oviposition sites. The biology, ecology and interrelationships of life forms co-living with the pests are aspects which must be explored in order to minimize hazards of control measures on economic life forms and natural enemies of the pests. A mathematical model is included which uses the net reproduction rate to determine population status, decide on effective dosages of control measures, and test the measures individually and in an integrated system.

72-1612. Das, M.; Singha, P.; Wattal, B. L.; Raghavan, N. G. S. (National Inst. of Communicable Diseases, Delhi, India). **Some theoretical considerations relating to sterile/incompatible male technique in an integrated pest control programme.** *J. Commun. Dis. 2(1-4): 25-32; 1970.* (13 references)

Release of sterilized/incompatible males is effective in controlling insect populations which are localized and non-sporadic. A mathematical model explaining the concept of population dynamicism indicates that the release of sterile males diminishes the reproductive potentiality of the species, and thereby brings about pest control. The system should be integrated with natural rather than insecticidal control measures to avoid abruptly disturbing the ecosystem and accelerating population growth.

72-1613. Risebrough, R. W. (Inst. of Marine Resources, Dept. of Nutritional Sciences, U. of California, Berkeley, CA). **Chlorinated hydrocarbons.** **In:** *Impingement of Man on the Oceans, D. W. Hood, Ed., Wiley-Interscience, New York, 1971, pp. 259-286.* (81 references)

The chapter reviews information on DDT, polychlorinated biphenyls(PCB's) and other organochlorines found in the ocean and in wildlife having no contact with the continents. DDT and PCB's are transported via air and water and concentrated in the food chain in a similar manner. While agricultural application of pesticides and industrial uses are responsible for part of the world-wide distribution of many organochlorines, leakage from manufacturing plants could contribute significantly to local levels, and thus eventually to levels in the ocean. A calculation, however, based on annual river flow and average concentration of DDT indicates that only about 0.1% of the amounts used in the U.S. per yr reaches the sea and the rivers. Data is lacking in the areas of fallout, partition coefficients among components of the marine community, and rate of deposition in the sediments. Proof of effects on fish reproduction is also lacking, but mounting evidence suggests that reproduction in bird populations has been detrimentally affected. Mechanisms are slowly being elucidated. Scientists in universities and other private institutions must assume responsibility for gathering more impartial data, since industry and government do not always consider all facts necessary for decisions in the public interest.

72-1614. Cole, D. W. (College of Forest Resources, U. of Washington, Seattle, WA). **Forest management practices.** **In:** *Impingement of Man on the Oceans, D. W. Hood, Ed., Wiley-Interscience, New York, 1971, pp. 503-527.* (70 references)

Discharge rates, nutrient losses and other effects of forests on waterways are discussed. Although actual observations are lacking, it is expected that addition of biocides affect ion transport, influencing the nutrient content of waterways. Generally, direct effects on aquatic biota have been reported after application of pesticides to an entire drainage basin. Careful application has not resulted in damage to the aquatic environment. Erosion, caused by logging, scarification, road building and cultivation, and vertical transport, increased by application of urea and other fertilizers, could affect movement of persistent chemicals for years after application. Good management practices are essential, but it is believed that water quality depends more heavily on proper management by urban and industrial planners who do not have the established goal of maintaining a living system.

72-1615. Finklea, J.; Priester, L. E.; Creason, J. P.; Hauser, T.; Hinners, T.; Hammer, D. I. (Div. of Health Effects Research, National Environmental Research Center, Office of Research and Monitoring, Environmental Protection Agency, Research Triangle Park, NC 27711). **Polychlorinated biphenyl residues in human plasma expose a major urban pollution problem.** *Amer. J. Pub. Health 62(5): 645-651; 1972.* (18 references)

Plasma levels of polychlorinated biphenyls (PCB) and organochlorines were determined in 723 human volunteers from Charleston County, S. C. DDE and *p,p'*-DDT were found universally, with concentrations 15 times those of *o,p'*-DDT, TDE and dieldrin. Levels of PCB residues, present in 43% of the population, were intermediate ranging up to 29 ppb. All the pesticide residues, except dieldrin and PCB, changed significantly with age. Sex effects were observed only with *p,p'*-DDT and DDE. Race, residence and race-residence interaction effects were noted. There were smaller amounts of PCB residues in Blacks than Whites; DDE and *p,p'*-DDT residue concentrations were highest in rural Blacks and intermediate in urban Blacks. PCB residues did not appear related to dietary intake or to usage as an organochlorine synergist. The total DDT to PCB residue ratio for urban and rural Whites was similar to that observed in birds captured near the city. Blacks, especially rural Blacks, exhibited ratios similar to those found in wildlife from remote areas.

72-1616. Sanders, H. O.; Chandler, J. H. (Fish-Pesticide Research Lab., Bureau of Sport Fisheries and Wildlife, U. S. Dept. of the Interior, Columbia, MO). **Biological magnification of a polychlorinated biphenyl (Aroclor 1254) from water by aquatic invertebrates.** *Bull. Environ. Contam. Toxicol. 7(5): 257-263; 1972.* (14 references)

In laboratory studies, polychlorinated biphenyls (PCB) were monitored in four species of immature aquatic insects and four species of crustacea that had been exposed to labelled Aroclor 1254. After 4 days exposure to approximately 1 ppb of the PCB, organism concentrations ranged from 0.2 ppm in crayfish to 52 ppm in daphnid. In some organisms, an equilibrium concentration was reached within the time of the experiment. A gas chromatographic analysis of the PCB residues in scud revealed a progressively greater uptake of the lower chlorinated PCB isomers. Lower chlorinated components were not observed, indicating that reductive dechlorination did not occur.

72-1617. Horvath, R. S. (Dept. of Biology, Bowling Green State U., Bowling Green, OH 43403). **Cometabolism of the herbicide, 2,3,6-trichlorobenzoate by natural microbial populations.** *Bull. Environ. Contam. Toxicol. 7(5): 273-276; 1972.* (4 references)

Lake water samples containing 0.232 mg/ml of 2,3,6-trichlorobenzoate (2,3,6-TBA) yielded a reduction in the 2,3,6-TBA concentration of 35% in 18 days, while the same reduction was achieved in 4 days by samples containing 0.232 mg/ml 2,3,6-TBA and 0.5 mg/ml sodium benzoate. A sterilized control yielded no reduction in herbicide concentration. No microbial growth occurred in either water containing the herbicide or sodium benzoate. Intermediate oxidation products could not be isolated, indicating a complete mineralization. It was suggested that field application of a biodegradable analog in conjunction with a chlorinated aromatic pesticide might eliminate some of the environmental hazard by encouraging oxidation of the compound.

72-1618. Dobson, R. C.; Fahey, J. E.; Ballee, D. L.; Baugh, E. R. (Purdue U. Agriculture Experiment Station, Dept. of Entomology, Lafayette, IN). **Dieldrin and heptachlor epoxide residues in fat from hogs foraging on corn stover in insecticidally treated fields.** *Bull. Environ. Contam. Toxicol. 7(5): 311-320; 1972.* (3 references)

Hogs feeding on corn stover in fields treated with aldrin or heptachlor accumulated from 0.080 to 0.141 ppm of dieldrin and from 0.032 to 0.071 ppm of heptachlor epoxide, respectively, in the adipose tissue. Soil contamination was believed to be responsible for residues found in corn stover. Aldrin was found to break down rapidly in soil, leaving the slowly degrading dieldrin. Heptachlor degraded rapidly to the epoxide, which also degraded after a period of weathering. Dieldrin tissue levels dropped when animals were removed from treated fields, but levels of heptachlor epoxide showed little change.

72-1619. Grossklaus, D. (Bundesgesundheitsamt, 1 Berlin 33, Germany). **Fremde Stoffe und gesundheitlich bedenkliche Rueckstaende in Gefluegelfleisch. [Adulterants and residues which offer a threat to health in poultry meat.]** *Bundesgesundheitsblatt 15(3/4): 42-50; 1972.* (19 references) (German)

Pesticide residues in poultry may result when insecticides are used to control ectoparasites or to minimize insect infestation of sheds; the ingestion of contaminated feed is another pesticide residue source and is especially difficult to detect and control. A preliminary study of contamination in West German poultry revealed residue levels of 0.02 to 0.05 ppm. This was identical with the range found in the remainder of Western Europe, but below that in Eastern Europe where levels up to 2.0 ppm were found. These values are based on analyses of flesh rather than fatty tissue; therefore, it seems probable that East European poultry might contain residues above 7.0 ppm DDT/DDE and 0.7 ppm lindane (fat basis), the acceptable levels established by the World Health Organization. Residue monitoring, preferably with the aid of gas chromatography, is needed to protect the health of the consumer. Gas-chromatographic monitoring for polychlorinated biphenyls (PCB) is also advisable, due to their widespread contamination of the environment.

72-1620. Freed, V. H.; Haque, R.; Schmedding, D. (Dept. of Agricultural Chemistry, Oregon State U., Corvallis, OR 97331). **Vaporization and environmental contamination by DDT.** *Chemosphere 1(2): 61-66; 1972.* (19 references)

Loss of DDT through evaporation appears to be causing pesticide contamination in areas near treatment sites. When DDT evaporates from its own surface or from the surface of an inert material, loss is comparatively high. Soils high in organic matter show smaller losses than sandy soils which contain fewer adsorption sites. Calculated and determined evaporative losses closely agree. While the literature reviewed does not show vaporization to be an important factor in world-contamination, further study is still needed. DDE, a major metabolite of DDT, has a vapor pressure almost 8 times greater than *p,p'*-DDT.

72-1621. Cox, J. L. (Stanford U., Palo Alto, CA). **DDT residues in coastal marine phytoplankton and their transfer in pelagic food chains.** *Diss. Abstr. Int. 32(11): 6213B; 1972.*

DDT residues were analyzed in phytoplankton and detrital material (collected by net or by continuous-flow centrifugation), seawater samples, surface and midwater fishes, and zooplankton. Phytoplankton samples collected in Monterey Bay, California from 1955 to 1969 contained compounds identified as *p,p'*-DDT, *p,p'*-DDD (TDE), and *p,p'*-DDE. Total concentrations of these compounds were about three times higher in the later samples. Uptake studies with pure cultures of marine phytoplankton were conducted. They indicated that when the algal cells were exposed to low parts per trillion nominal concentrations of ^{14}C-DDT in the medium, they could concentrate the labelled DDT by factors ranging from 3 to 8×10^4. DDT residue concentrations in whole seawater were determined by continuous-flow liquid-liquid extraction, and ranged from 2.3×10^{-12} g/ml off Oregon and Washington, to 5.6×10^{-12} g/ml off Southern California. Experimental results were described which suggest adsorption as the uptake mechanism for algal cells; these experiments also supported the idea that 1-2 μ diameter particles carry most of the DDT residues in whole seawater. (Author abstract by permission, abridged. University Microfilms, Order No. 72-5903, not microfilmed. Available for consultation at Stanford U. Library)

72-1622. Boucher, F. R.; Lee, G. F. (Water Chemistry Program, U. of Wisconsin, Madison, WI 53706). **Adsorption of lindane and dieldrin pesticides on unconsolidated aquifer sands.** *Environ. Sci. Technol. 6(6): 538-548; 1972.* (15 references)

The adsorption of lindane and dieldrin on natural aquifer sand from Portage County, Wis., was investigated in laboratory batch tests. From aqueous solutions whose concentrations were in the range of 5 to 500 μg of pesticide/l., the corresponding adsorption capacity of the sand was in the ng/g range. The range of temperature and pH likely to occur in an aquifer would have no significant effect on the uptake of dieldrin and lindane. The naturally occurring dissolved organics present in two Wisconsin lake waters were found to reduce the adsorption of dieldrin. However, lindane adsorption was unaffected by the same organics. Nearly 70% of the adsorbed lindane was leached in three successive washes of distilled water. In contrast, less than 20% of the dieldrin adsorbed by the aquifer sand was removed after three washes. (Author abstract reprinted by permission of the American Chemical Society)

72-1623. Dimond, J. B.; Getchell, A. S.; Blease, J. A. (Dept. of Entomology and Biochemistry, U. of Maine, Orono, ME 04473). **Accumulation and persistence of DDT in a lotic ecosystem.** *J. Fish. Res. Bd. Can. 28(12): 1877-1882; 1972.* (20 references)

DDT was monitored for 10 yr in a lotic ecosystem in Maine where its history of application was precisely known. High initial levels were found in all stream components following a single application at 1 lb/acre. After 2 yr, when residues dropped rapidly, little change was noted. Different watersheds showed a wide variation in residues. Residues after three applications did not always exceed those found after two applications, possibly because measurements were sometimes made closer to time of application in the latter case. Concentration factors obtained with various animals and plants ranged from 6 to 450. Although the present study did not demonstrate specific harmful effects, further research was suggested.

72-1624. Robinson, J. R. (Research Inst., Canada Agriculture, University Sub P. O., London 72, Ont., Canada). **Residues containing phosphorus following phosphine treatment: measurement by neutron activation.** *J. Stored Prod. Res. 8(1): 19-26; 1972.* (12 references)

Samples of pure, essentially metal-free cellulose paper were assayed for non-volatile phosphorus residues by neutron activation analysis, after being exposed to phosphine gas generated *in situ* from Phostoxin. As the concentration of phosphine applied was increased the phosphorus deposition also rose, but at higher concentration the effect was less pronounced. In some cases the residue exceeded 10 ppm. It was suggested that adsorption of phosphine in a mono-molecular layer on the surface occurs first, followed by fixation by oxidation.

72-1625. Elms, K. D.; Kerr, J. D.; Champ, B. R. (c/o P. O. Bohle, 4810, Queensland, Australia). **Breakdown of malathion and dichlorvos mixtures applied to wheat.** *J. Stored Prod. Res. 8(1): 55-63; 1972.* (7 references)

The rate of decay of malathion and dichlorvos, separately and together, was investigated after they were

applied to wheat in 25% aqueous acetone at levels of 0 to 20 ppm (under storage conditions). The rate of breakdown for dichlorvos was affected by its concentration and by the concentration of malathion applied simultaneously or at a later date; however, differences were quite small and did not significantly alter the time required for dichlorvos to be reduced to acceptable levels under storage conditions. When malathion and dichlorvos were applied together, the half-life of malathion was increased 1.5 times. In situations where malathion is temporarily maintained at higher than permissible levels, this increase should receive consideration.

72-1626. Coulson, J. C.; Deans, I. R.; Potts, G. R.; Robinson, J.; Crabtree, A. N. (Dept. of Zoology, U. of Durham, Durham, England). **Changes in organochlorine contamination of the marine environment of Eastern Britain monitored by shag eggs.** *Nature (London) 236(5348): 454-456; 1972.* (12 references)

Dieldrin and *p,p'*-DDE levels were monitored in shag eggs collected from the Isle of May, Fife, Scotland and the Farne Islands, Northumberland, between 1964 and 1971. Other organochlorine concentrations were not significant. Dieldrin concentrations reached a maximum in 1966 and then started to decline, dropping 66% by 1971. During this same period, heavy restrictions were placed on use of this pesticide and its sale decreased by 69% from 1964 to 1970. These restrictions seem to have resulted in the decreased coastal contamination. For *p,p'*-DDE, the maximum concentration appeared in 1967 and 1968, and by 1971 the level had decreased 47%. No information was available on the use of DDT during these years. The study has particular interest in relation to mathematical models for the behavior of contaminants in ecosystems.

72-1627. Rammell, C. G.; Thompson, C. J. (Wallaceville Dairy Lab., Dept. of Agriculture, Wellington, New Zealand). **DDT residues in market milk.** *N. Z. J. Sci. 14(2): 261-266; 1971.* (15 references)

Total DDT content in market milk was monitored for 1 yr in New Zealand. Acid-stable chlorinated hydrocarbons other than *p,p'*-DDT and its breakdown products were not detected. The average concentration of DDT in milk fat was 0.18 ppm, and it was estimated that an average of 2.5 μg DDT/day was ingested per person from market milk. A cyclic pattern of DDT levels appeared, concentrations being highest from June to September and lowest from December to February. Only 3 of the 585 samples had DDT levels which exceeded the accepted tolerance limit of 1.25 ppm.

72-1628. Bullivant, M. J.; Pattenden, G. (Dept. of Chemistry, University College, Cardiff, U. K.). **Photochemical decomposition of chrysanthemic acid and its alkyl esters.** *Pyrethrum Post 11(2): 72-76; 1971.* (17 references)

As a step toward understanding the photochemical decomposition of pyrethrin esters, an investigation of the photochemistry of chrysanthemic acid (CA) and its alkyl esters was carried out. A 5:1 mixture of acidic and neutral products was obtained upon irradiation of (±)-*trans*-CA, using a medium pressure mercury lamp in the absence of oxygen. The major neutral component was identified as the lactone. The other major component formed was 3,3-dimethylacrylic acid. No significant decarboxylation was observed. Once equilibrium was established a 1:2 *cis-trans* ratio of CA isomers was found. A similar ratio was found following photolysis of the methyl ester, and the lactone was also formed. Racemization of both the *cis-* and *trans-* isomers was almost complete. Based on this racemization an overall 2- to 4-fold loss in activity was predicted after photolysis of natural pyrethrin I esters.

72-1629. Phillips, F. T. (Rothamsted Experimental Station, Harpenden, Herts, England). **Persistence of organochlorine insecticides on different substrates under different environmental conditions. I. The rates of loss of dieldrin and aldrin by volatilisation from glass surfaces.** *Pestic. Sci. 2(6): 255-266; 1971.* (19 references)

The losses of dieldrin and aldrin by volatilization from crystalline deposits on glass surfaces in different environments were studied by using these insecticides labelled with the radioactive isotope ^{36}Cl as a tracer. Volatilization rates were very sensitive to changes in temperature and to a lesser extent to air movement, but not to change in relative humidity (the effect of which was measurable only on porous glass surfaces). All rates of loss from glass surfaces could be described mathematically in terms of single or double exponential equations, although many were better described by simple sigmoid (logistic) equations. (Author abstract by permission)

72-1630. Kanazawa, J. (National Inst. of Agricultural Sciences, Nishigahara, Kita-ku, Tokyo, Japan). **Survey of pesticide residue in agricultural commodities in Japan.** *Jap. Pestic. Inform. 11: 5-16; 1972.*

The problems Japan has with pesticide residues in food and their proposed solutions are reviewed. Application dosages of pesticides by the 1960's were about six or seven times higher than those in Europe and America. As research also revealed high residues in humans, particularly of mercury and BHC, the use of mercurials and organochlorines such as DDT, BHC and cyclodienes in agriculture was restricted. Detailed studies showed that mercurials and BHC were absorbed into rice and other foodstuffs. Residue patterns for insecticides such as EPN, carbaryl and propoxur, were found to be similar to those of DDT and BHC. Much has been learned about the factors that influence residue absorption and degradation, and data are supplied on the distribution of residues in various edible portions of plants. Success in removing residues by washing depends on residue pene-

tration into the plant. Cooking removes some residues such as BHC by steam distillation.

72-1631. Iijima, T. (Komoro Branch Hospital of Saku General Hospital, Komoro-shi, Nagano Prefecture, Japan). **[Accumulation of mercurial pesticides in the fetus.]** *Baioteku (Biotech) 3(6): 471-476; 1972.* (19 references) (Japanese)

An assessment was made of the risk of fetal damage due to accumulation of mercury-containing pesticides in the environment; the mercury content was determined in specimens obtained from women of farming and nonfarming families and from their babies born between Nov. 1965 and Jan. 1966. The total mercury content (dithizone method) in the hair of 25 farm mothers and their 25 babies averaged 9.89 ppm; in the placentas, 0.35 ppm; and in the mothers' colostrum, 0.54 ppm. In the hair of 25 nonfarm women the total mercury content averaged 5.61 ppm, and in their babies' hair, 7.01 ppm. The placentas in these cases contained 0.26 ppm of mercury, and the colostrum 0.50 ppm. In the farming group, the baby's hair had a higher mercury content than the mother's in 18 cases; this was true in 15 cases in the nonfarming group. The greater mercury content in the specimens from the farming group was statistically confirmed at the 5% probability level, except for colostrum. Thus it may be assumed that the elevated mercury levels could have resulted from occupational contact with pesticides.

72-1632. Neururer, H. (Bundesanstalt fuer Pflanzenschutz, Vienna, Austria). **Untersuchungen ueber das Verhalten von Herbiziden im Boden. I.Teil. [Studies on herbicides in soil. Part I.]** *Bodenkultur 23(1): 43-73; 1972.* (German)

Herbicides which offer a predictable level of prolonged activity in the soil are gaining in importance, in contrast to those which work for a short time via the leaf system. Following a review of the literature on the behavior of herbicides in soil, the results of laboratory experiments on herbicide detection (bioassay) and herbicide adsorption by clay and humus are outlined. Tests presently under development include a root growth test for herbicide detection in soil and plant extracts, a modified root pattern test for herbicide detection in soil, and root growth differentiation tests for the qualitative detection of herbicides. Soil migration studies on four different soil types were performed in a greenhouse; the migration of the herbicides under conditions simulating a natural rainfall of 30 mm ranged from 0 cm for diquat and paraquat to 32 cm for Vapam (SMDC) and allyl alcohol. Growing an assortment of 12 cultivated and wild plants in test soil permitted qualitative detection of the herbicide present, based on changes in plant appearance. Inactivation times measured for various herbicides in greenhouse experiments ranged from 0 days for paraquat and diquat to 9 mo for picloram. In each bioassay, the plant responding most sensitively to the given herbicide was used. (For Part II, see Abstract No. 72-1633)

72-1633. Neururer, H. (Bundesanstalt fuer Pflanzenschutz, Vienna, Austria). **Untersuchungen ueber das Verhalten von Herbiziden im Boden. II.Teil. [Studies on the behavior of herbicides in soil. Part II.]** *Bodenkultur 23(2): 138-172; 1972.* (130 references) (German)

In a continuation of experiments performed in the laboratory and greenhouse (see Abstract No. 72-1632), the behavior of a number of herbicides was studied on four test fields with different soil types in eastern Austria. The quantity of precipitation on the experimental plots had a decisive influence on the activity of herbicides; apparently, most of the soil-acting herbicides required rainfall amounting to 20-30 mm during the first two to three weeks for full activation. The quantity of precipitation also affected the washdown of the herbicides into the subsurface soil. The effects of rain were intensified in soils with low herbicide adsorption, i.e., low humus contents. High moisture and heat led to rapid degradation of herbicides in the soil. Vaporization of herbicides from soil in hot weather can damage crops. High soil humus contents accelerate the inactivation of the herbicides in the soil by adsorption and degradation, and humus levels of 2-6% provide optimal herbicide action. Significant amounts of some herbicides, such as lenacil, are adsorbed strongly by clay as well. An exchangeability seems to exist between herbicides and nutrients (especially potassium) in the clay-humus complex.

72-1634. Tkachuk, R. (Board of Grain Commissioners, Grain Research Lab., Winnipeg 2, Manitoba, Canada). **Phosphorus residues in wheat due to phosphine fumigation.** *Cereal Chem. 49(3): 258-267; 1972.* (22 references)

Wheat was treated under practical fumigation conditions with 8 to 23 ppm $^{32}PH_3$ for 4 and 5 days; 3.8 to 7.4 ppm of $^{32}PH_3$ reacted with wheat to form nonvolatile residues. Types of atmosphere, CO_2 or air, seemed to have no effect. At smaller doses, larger relative amounts of PH_3 formed residues. Residues formed with rapeseed and flax were larger, while those formed with flour were smaller. Distribution of residues in milled wheat was 85% in bran, 12% in flour and 4% in germ. Hypophosphite (88%) and pyrophosphate (12%) made up the water soluble fraction of the bran residue. The 37% portion which was insoluble in water was not identified and its role in causing damage or chemical changes in food could not be determined.

72-1635. Takami, F.; Wakahara, S.; Maeda, T. (Shionogi Research Lab., Shionogi & Co., Ltd. Fukushima-ku, Osaka, Japan). **Decomposition of dithiocarbamates in weakly acidic solutions.** *Chem. Pharm. Bull. 20(3): 619-620; 1972.* (7 references)

Kinetic measurements were obtained spectrophotometrically on three *N*-mono-substituted dithiocarbamates derived from primary amines of different *pKa*. Based on this information, a mechanism was proposed for the decompositions of dithiocarbamates in weakly acidic solutions. It was concluded that the rate-determining step is the N-C bond cleavage, and that proton transfer occurs after cleavage.

72-1636. Krechniak, J.; Dubrawski, R.; Czarnowski, W. (Katedra Chemii Toksykologicznej i Sadowej, Akademii Medycznej w Gdansku, Gdansk, Poland). **Badania nad pozostaloscia DDT w glebach powiatu koscierskiego. [Studies on the DDT residues in soils of the Koscierzyna district.]** *Gdansk. Tow. Nauk. Rozpr. Wydz. III 8: 65-71; 1971.* (11 references) (Polish)

Insecticidal preparations containing DDT have often been used in agriculture, especially in combatting the Colorado beetle. Because of its physico-chemical properties, DDT is highly stable and tends to accumulate in the soil. Excessive DDT accumulation changes the physico-chemical and biological makeup of the soil, and increases the possibility of DDT penetration into crops and groundwater. Studies were made therefore on the rate of DDT disappearance over a four-year period in a podzol-type soil of the Koscierzyna district. The DDT content was assayed by colorimetry and thin-layer chromatography. The DDT content of the soil was found to be proportional to the quantity applied. DDT was detected in all samples analyzed, in amounts of 0.04 to 0.12 ppm. The calculated half-life for DDT in this type of soil was about 9 years.

72-1637. Krechniak, J.; Dubrawski, R. (Katedra Chemii Toksykologicznej i Sadowej, Akademii Medycznej w Gdansku, Gdansk, Poland). **Badania moczu pracownikow zawodowo stykajacych sie z pestycydami. [Examination of urine of workers in occupational contact with pesticides.]** *Gdansk. Tow. Nauk. Rozpr. Wydz. III 8: 73-79; 1971.* (17 references) (Polish)

The number of agricultural workers coming into contact with plant protection agents, especially with organochlorine insecticides, has increased greatly in recent years. Chronic poisoning by this group of compounds is not symptom-specific. It is therefore important that rapid screening techniques be developed to monitor worker contact, and these could be administered during periodic medical examinations. In general, screening for organochlorine poisoning is based on the determination of metabolites of specific substances, or on the total organochlorine content of the urine. For workers from the Koscierzyna District, who had occupational contact with pesticides, the medical examination included an assay of DDA concentration in the urine to monitor for DDT exposure; in testing for nonspecific exposure, a determination was made of ascorbic acid, reduced glutathione, sodium, potassium, calcium, chlorides and sulfates. Out of a group of 52 workers who had been in contact with pesticides for 1 to 20 yrs, 23% had elevated DDA levels in their urine.

72-1638. Shtarkas, Ye. M. (Research Inst. Epidemiology, Microbiology and Hygiene of the Lithuanian SSR Ministry of Public Health, Vilna, USSR). **O glubine proniknoveniya pestitsida GKhTsG v prisutstvii sul'fonola s vodoy cherez grunt. [Depth of BHC penetration into the ground in the presence of sulfonol and water.]** *Gig. Sanit. 37(2): 106-108; 1972.* (Russian)

The dynamics of BHC penetration in the soil as carried by water in the presence of detergents was studied. A model was used consisting of a column system filled with soil samples characterized by definite granulometric compositions. Soil sample #1 contained 86.8% of particles ranging from 5 to 0.5 mm and soil #2 contained 92.4% of particles ranging from 1.0 to 0.1 mm. Tap water was contamined with 2.0 or 20 mg BHC/l. and with 5.0 mg/l. of sulfonol and passed through the soil columns. Residual amounts of the two compounds in water were then determined by TLC. The depth of BHC penetration into the soil depended upon its granulometric composition; the residual amounts of contaminants found in the filtered water depended on the initial contamination level. BHC traveled deeper in the coarse soil samples and in the presence of sulfonol. Conversely, sulfonol appeared to hinder the penetration of BHC in the fine granular soil samples; this was attributed to alterations of the fine particle surface absorption capacity due to foam formation. Apparently, BHC forms a labile combination with the soil particles and can be washed off from time to time, being carried by the water into the ground.

72-1639. Mizutani, T.; Matsumoto, M.; Fujiwara, K. (Kyoto Municipal Inst. of Hygiene, Kyoto, Japan). **[Accumulation of polychlorobiphenyls and organochlorine pesticide residues in human fat.]** *Igaku No Ayumi (Prog. Med. (Tokyo)) 81(10): 666-667; 1972.* (10 references) (Japanese)

Organochlorine pesticide residues and the polychlorinated biphenyl contents of lipid fractions were examined in specimens excised during surgery. All of the patients lived in the Kyoto area, and were between 35 and 75 years of age. Lipids were extracted with *n*-hexane from 15 greater omenta, 3 stomachs and one abdominal wall specimen. Part of the extracted fat was subjected to direct cleanup by the method of Holden; the PCB was removed, and the pesticide and PCB components determined separately by gas chromatography. PCB was removed from the fraction to be analyzed for DDE by oxidation with chromium oxide. The mean PCB concentration in human fat thus found was 4.7 ppm; α-BHC 0.22 ppm; β-BHC 10.9 ppm; γ-BHC (lindane) 0.55 ppm; *p,p'*-DDT 1.4 ppm; *p,p'*-DDE 7.5 ppm; and dieldrin 0.19 ppm.

72-1640. Deubert, K. H. (Cranberry Experiment Station, U. of Massachusetts, East Wareham, MA). **Dieldrin on and around cranberry bogs.** *Mass. Agr. Exp. Sta. Res. Bull. 593: Nov. 1971, 19 pp.* (17 references)

In research over the past 6 years, dieldrin has been found practically everywhere in the environment, though it appears that polychlorinated biphenyls (PCB) and chlorinated naphthalenes may have interfered in early assays, yielding high values. Experience at the Experiment Station has also indicated that fuel oil and rubber may contain compounds which interfere with dieldrin determination. Laboratory and field percolation studies showed that dieldrin moved most rapidly vertically when sand, having a small surface area, was the medium. When organic matter was present, as in cranberry bog soil, most of the insecticide adhered to the soil. Persistence was greatest in bogs with high organic content. Since physical forces were found to bind the compound in soil, it was probably absorbed quickly and slowly released as an active insecticide. Flood water did not contain an increased dieldrin content and bottom sediments in estuaries near to and having no connection with the cranberry bogs contained residues in the range of 0.02 to 0.04 ppm. No differences were found in residues in estuarian water samples or shellfish collected close to or away from the bogs. The data collected are considered too high because of interfering unknowns. Banning production of dieldrin does not seem to be the answer to pollution.

72-1641. Kaai, M.; Yonemura, J. (Tokyo Dental U., Chiyoda-ku, Tokyo, Japan). **[Studies on pesticide application in vinyl plastic greenhouses, especially pertaining to aerial contamination and pesticide adhering to clothing.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 376-377; 1971.* (Japanese)

The concentration of dichlorvos in the air of a plastic-covered greenhouse decreased from 0.450 ppb immediately after spraying, to 0.197, 0.183 and 0.102 ppb after 1, 2 and 3 hr respectively. These values are below the maximum allowable value of 1 ppm. Dichlorvos was taken up by filter paper attached to the clothing of the spray operator at various locations. The concentrations found (in $\mu g/cm^2$) were: head, 1.41; mask, 2.76; right shoulder, 1.13; left shoulder, 1.07; right forearm, 0.87; left forearm, 44.76; chest, 4.56; abdomen, 30.63; right knee, 3.28; left knee, 13.09; back of collar, 0.30; upper back, 1.13. The operator's clothes were more heavily wetted on the left side, especially on the lower portion of the body, probably indicating that the liquid was picked up while the operator was walking between the already-sprayed rows. Therefore, waterproof covering for the lower body is important. In the case of fumigation of the vinyl-plastic-covered greenhouses with dichlorvos, the aerial concentrations immediately afterward and at 1, 2 and 3 hr after spraying were found to by 2.180, 1.18, 0.22 and 0.063 ppb respectively. Thus the residual concentration in air was no longer hazardous 2 hr after fumigation.

72-1642. Matsushima, S.; Kawanishi, A.; Asanuma, S.; Hagiwara, A. (Japan Inst. for Rural Medicine, Saku-shi, Nagano Prefecture, Japan). **[Relationships between working conditions and pesticide applications in a vinyl plastic covered greenhouse. Part II. Determination of pesticide residues in air.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 377-378; 1971.* (Japanese)

With increases in vinyl plastic-covered greenhouses for food growing, a syndrome has been recognized among farmers known as "greenhouse disease". The syndrome is due to the high temperature and humidity in the working area, inhalation of pesticides in the greenhouse, and cramped working conditions. The residue in the air of such a greenhouse (dimensions: 3.5 X 10 X 2.5 m) was determined after spraying a 1000-fold dilution of 19.5% aldrin EC at 700 ml/m^2. Immediately after spraying, the aldrin concentration in air samples was taken at upper center, lower center, side wall, doorway and in the corner and was found to be 80.0, 82.4, 100.4, 84.8 and 60.8 mg/m^3 respectively. After 3 hr and with both doors open and wind velocities of 0.5-2.0 m/sec outside and 0.3 m/sec inside the greenhouse, the residues in air at the respective locations amounted to 0.5, 0.6, 1.4, 0.0, and 2.5 mg/m^3. In another experiment, 3 hr after spraying and with an average wind velocity of less than 0.5 m/sec, the residue found in the air at the center of a greenhouse with doors and skylight shut was 7.6 mg/m^3; with skylight only opened, 10.2 mg/m^3; with doors only opened, 12.0 mg/m^3; and with both doors and skylight open, 0.2 mg/m^3. The concentration in the air decreased to 0.9 mg/m^3 after 12 hr with all doors and skylight shut.

72-1643. Kawanishi, A.; Asanuma, S.; Wakatsuki, S.; Matsushima, S.; Ide, T. (Inst. for Rural Medicine, Saku-shi, Nagano Prefecture, Japan). **[Investigation of environmental pollution due to organochlorine pesticides and their residues on foods.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 378-379; 1971.* (Japanese)

Specimens of river water, bottom mud, riverbank soil, and fish were collected at seven locations along the Chikoma river and analyzed for organochlorine pesticides. In all soil samples, α- and γ-BHC were detected. Although organochlorine compounds were present in the water samples in extremely small quantities, α- and γ-BHC were detected with certainty. The homogenized fish samples contained α-BHC and large amounts of DDE. DDT was detected in the soil of fields (max. 246.28 ppm), in bottom mud and in fish. Pesticide residues were also studied in rice samples collected near the Institute (1968 and 1969 crops), milk samples collected

in March 1971, 33 samples of vegetable crops to which organochlorine pesticides were not applied, and the soils on which the crops were grown. Both α- and γ-BHC were detected in unpolished rice, and α-BHC in all of the polished rice samples. Residues of the four BHC isomers, DDE and aldrin were detected in the milk samples. Although the average values in these cases were below the internationally recommended values, some individual DDE and aldrin values exceeded the recommended tolerances. Different vegetables (Chinese cabbage, cabbage, lettuce, soybeans) showed different tendencies to accumulate pesticides.

72-1644. Sugaya, T. et al. (Inst. for Rural Medicine, Hiraka General Hospital, Akita Prefecture, Japan). **[Organochlorine pesticide residues in human milk.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 379-380; 1971.* (Japanese)

Organochlorine pesticide residues in 14 samples of human milk collected about 10 days after childbirth were analyzed by gas chromatography. The average values found were: α-BHC 0.0275 (0.075-0.009) ppm; β-BHC 0.022 (0.045-0.007) ppm; γ-BHC 0.024 (0.039-0.011) ppm; *p,p'*-DDE 0.047 (0.096-0.016) ppm. Only one sample contained *o,p'*-DDT, at 0.017 ppm. No significant differences were noted between residue values for farming and nonfarming families, though the total BHC content in farm women was 0.0797 vs. 0.066 ppm in nonfarm women. The *p,p'*-DDE values averaged 0.025 ppm in farm women and 0.054 ppm in non-farm women. Younger mothers displayed higher total BHC and *p,p'*-DDE levels in their milk than older ones, and insecticide contents in milk from multiparas were higher than those from primiparas. Total BHC and *p,p'*-DDE levels in milk were generally correlated.

72-1645. Foehrenbach, J.; Mahmood, G.; Sullivan, D. (N. Y. State Dept. of Environmental Conservation). **DDT residues in eggs of marsh-inhabiting birds.** *N. Y. Fish and Game J. 17(2): 126-127; 1970.* (6 references)

Eggs from abandoned nests of the clapper rail, blackcrowned night heron and marsh hawk were collected along Long Island and analyzed for DDE, TDE and DDT by gas chromatography. Residues in rail eggs were rather consistent and much lower than those in the night heron or marsh hawk eggs; this was probably due to differences in feeding habits. The values, ranging from 0.36 to 0.40 mg/kg, were also considerably lower than those found in other birds who were thought to be declining due to the effect of DDT on their eggs. Exposure to vacationers was suggested as a possible reason for the abandonment of rail nests.

72-1646. Mirna, A. (Institut fuer Chemie und Physik der Bundesanstalt fuer Fleischforschung, Kulmbach, Austria). **Zusatzstoffe, Hilfsstoffe und Rueckstaende in Fleisch und Fleischwaren. [Additives, adjuvants, and residues in meat and meat products.]** *Wien. Tieraerztl. Monatsschr. 58(11): 396-402; 1971.* (35 references) (German)

Although about 30% of the pesticides used in the U.S. fall into the organochlorine category, only about 3% of the pesticides used in West Germany are organochlorines. The organochlorines are the most slowly degrading of the commonly used pesticides. Their soil half-lives range from 3 to 10 years, and they can enter meat products by way of animal feeds grown in contaminated soil. They may also enter the animal flesh by the dermal route when used to control ectoparasites and barnyard pests. DDT and DDE are stored for a long time, especially in the fatty tissue, whereas in a skin-spraying experiment, all of the methoxychlor taken in was excreted after ten weeks. Decontamination studies have revealed that some of the pesticide residues in meat are removed by cooking, especially by cooking at high temperature or under pressure. According to studies performed in England, the intake of pesticides approaches the acceptable daily intake value established by the World Health Organization only in the case of dieldrin.

72-1647. Liang, T. T.; Lichtenstein, E. P. (Dept. of Entomology, U. of Wisconsin, Madison, WI 53706). **Effect of light, temperature, and pH on the degradation of azinphosmethyl.** *J. Econ. Entomol. 65(2): 315-321; 1972.* (17 references)

Effects of light sources of different wavelengths, temperature, and pH values on the breakdown of ^{14}C-azinphosmethyl in water or on glass surfaces were investigated. Primarily UV light (253 A) and to a lesser extent sunlight, degraded the insecticide to chloroform and water-soluble compounds, while the products from yellow (5889 A) and red (6563 A) light radiation were similar to those from nonirradiated controls. With 2-dimensional thin-layer chromatography, autoradiography, and selective color producing reagents, benzazimide, anthranilic acid, methyl benzazimide sulfide, and *N*-methyl benzazimide were identified as chloroform-soluble irradiation products and 4 unidentified compounds were found to be water soluble. None of these was toxic to insects. A rapid degradation of the insecticide occurred only above 37°C, and to a greater extent in water than on a glass surface. Chloroform-soluble breakdown products were methyl benzazimide sulfide, *N*-methyl benzazimide, and benzazimide, and traces of mercaptomethyl benzazimide and the oxygen analogue of azinphosmethyl. Six unidentified water-soluble compounds also were isolated. The insecticide was relatively stable in water below pH 10. At pH 11, chloroform-soluble azinphosmethyl metabolites were primarily methyl benzazimide sulfide and benzazimide; however, the water phase contained 97.7% of the applied radiocarbon after chloroform extraction. Analyses of this extracted water indicated the presence of anthranilic acid and benzazimide and 3 unidentified compounds. (Author abstract by permission)

72-1648. Sacher, R. M.; Ludvik, G. F.; Deming, J. M. (Agricultural Div., Monsanto Co., St. Louis, MO 63166). **Bioactivity and persistence of some parathion formulations in soil.** *J. Econ. Entomol. 65(2): 329-332; 1972.* (22 references)

The persistence and biological activity of parathion in soil was studied under laboratory and field conditions. Microbial breakdown appeared to be the major contributor to the loss of parathion in soil. Although moisture and soil type influence parathion degradation, this influence is mediated primarily by the activity of microorganisms. Highest biological activity against larvae of the western corn rootworm, *Diabrotica virgifera* LeConte, on soil was achieved with broad distribution and minimum binding of parathion (e.g., 1% kaolinite dust; LD50 = 0.05 ppm) whereas low activity was associated with tightly bound, thinly distributed formulations (e.g., 10% on charcoal; LD50 = 6.0 ppm). However, chemical assays of soil showed that the dust was the least persistent and the charcoal the most persistent formulation (50% breakdown in 6 days vs. 72 days, respectively). (Author abstract by permission)

72-1649. Harris, C. R.; Sans, W. W. (Research Inst., Dept. of Agriculture, London 72, Ont., Canada). **Behavior of dieldrin in soil: microplot field studies on the influence of soil type on biological activity and absorption by carrots.** *J. Econ. Entomol. 65(2): 333-335; 1972.* (10 references)

An experiment was conducted under field conditions, using microplots, with the object of studying the behavior of similar concentrations of dieldrin in soil in relation to soil type. Five soil types were used with organic contents ranging from 1 to 70%. The results indicated that persistence, vertical movement, insecticidal activity, and availability of dieldrin residues in soil for absorption by carrots were proportional not to concentration of the insecticide but to the organic content of the soil. It is suggested that in developing environmental criteria for pesticides, it will be necessary to consider not only the results of residue analyses but also the factors which will influence insecticide behavior in soil. (Author abstract by permission)

72-1650. Harris, C. R.; Sans, W. W. (Research Inst., Canada Dept. of Agriculture, London 72, Ont., Canada). **Behavior of heptachlor epoxide in soil.** *J. Econ. Entomol. 65(2): 336-341; 1972.* (21 references)

A study, in both the laboratory and the field, was conducted to elucidate the factors influencing the behavior of heptachlor epoxide in soil. Laboratory studies were devoted to determining the factors influencing insecticidal activity. As a direct contact poison, the epoxide was as effective or more so than heptachlor against 24- to 48-hr-old crickets, *Gryllus pennsylvanicus* (Burmeister); picture-winged flies, *Chaetopsis debilis* (Loew); and black cutworms, *Agrotis ipsilon* (Hufnagel). However, in soil it was less effective than heptachlor. Tests indicated that in soil it vaporized to an extent sufficient to cause fumigant toxicity to insects and that volatility was dependent on soil type, moisture, and temperature. The major factor influencing insecticidal activity was soil type, with toxicity in moist soil negatively correlated with organic content. Moisture and temperature were factors of lesser importance. Tests on persistence of biological activity in mineral soil indicated that the epoxide was more persistent than heptachlor, but slightly less persistent than dieldrin. Microplot field trials with 3 soil types containing 0.9, 16.6, and 51% organic matter treated with approximately 2 ppm of heptachlor epoxide indicated that while it was persistent in soil, insecticidal activity, absorption by crops, and mobility in soil were proportional to the organic content, rather than the concentration of insecticide. (Author abstract by permission)

72-1651. Van Middelem, C. H.; Habeck, D. H.; Strayer, J. R. (U. of Florida, Gainesville, FL 32601). **Residues on ryegrass following preplant or postemergence applications of four insecticides for mole cricket control.** *J. Econ. Entomol. 65(2): 495-497; 1972.* (3 references)

Ryegrass was treated with chlordane, diazinon, Dyfonate (*O*-ethyl *S*-phenyl ethylphosphonodithioate), and trichlorfon in bait and granular formulations. Pesticides were applied as a preplant treatment disked into the soil or as a single application to the grass 7 weeks after planting. Chlordane residues on ryegrass after a single foliar application of 0.5 and 3.0 lb per acre followed by 21 days of weathering were 2.1 and 3.2 ppm, respectively. Preplant application of 3.0 lb per acre of chlordane resulted in grass residues below 0.3 ppm throughout the sampling period. Following a 2.0-lb-per-acre foliar application of 14% diazinon granules, residues decreased from 15.3 to 0.3 ppm during the 21-day weathering period. Diazinon residues of less than 0.1 ppm were detected on grass samples taken 50 days after a 2.0-lb-per-acre preplant application to the soil. Dyfonate residues decreased from 16.8 to 0.5 ppm during the 21-day period after a 2.0-lb-per-acre foliar treatment. Under the same conditions, residues of Dyfonate oxygen analogue were found to be less than 0.2 ppm. After a 2.0-lb-per-acre preplant application to the soil, residues of Dyfonate or its oxygen analogue were insignificant. Trichlorfon residues decreased from 37.5 to 0.1 ppm during the 21-day weathering period after a 1.0-lb-per-acre foliar application. (Author abstract by permission)

72-1652. Kadoum, A. M.; Lahue, D. W. (Dept. of Entomology, Kansas Agricultural Experiment Station, Manhattan, KS 65502). **Degradation of malathion on viable and sterilized sorghum grain.** *J. Econ. Entomol. 65(2): 497-500; 1972.* (16 references)

The effect of the biological activity of the kernel

on the rate of malathion degradation was determined during 9 months of storage. The migration of malathion residue to the endosperm and embryo of sterilized sorghum grains was greatest during the 1st month of storage; however, the amounts recovered during that time accounted for only 41.4% of the remaining total malathion residue. After 3 months' storage, the total residue gradually decreased, until 34.3% of the initial total deposit remained at the end of 9 months. At all time intervals during the 9 months' storage, more malathion residue was detected on, and in, the sterilized sorghum kernels than on the live, viable kernels, but the patterns of residue decline were similar. Only 14% of the initial malathion deposit remained on the viable sorghum after 9 months' storage. These findings indicated that during a normal storage period enzymes contribute to the breakdown of malathion applied to sorghum grain as an insect protectant. (Author abstract by permission)

72-1653. Ward, C. R.; Owens, J. C.; Huddleston, E. W.; Ashdown, D.; Bailey, C. F. (Texas Tech U., Lubbock, TX 79109). **Phytotoxic and residual properties of disulfoton used on wheat.** *J. Econ. Entomol. 65(2): 561-563; 1972.* (5 references)

Foliar applications of disulfoton liquid concentrate at rates up to 2.5 lb active ingredient (AI) per acre resulted in negligible burn, rates up to 4 lb AI/acre resulted in slight burn but did not significantly affect yields. Three foliar applications of 0.75 lb AI/acre resulted in less than 0.3 ppm residue in straw and grain samples at harvest in 1968. Application of up to 3.5 lb AI/acre resulted in less than 0.02 ppm in straw and no more than 1 ppm in grain samples in 1969. Residues in foliage samples taken 14 days after the last of as many as 4 applications were 5 ppm or below, except in one case. Seed treated with 0.5 lb AI/cwt resulted in significant stand reductions, but residues were below 5 ppm 14 days after planting. (Author abstract by permission)

72-1654. Ware, G. W.; Estesen, B. J.; Cahill, W. P.; Frost, K. R. (Dept. of Entomology, U. of Arizona, Tucson, AZ 85721). **Pesticide drift V. Vertical drift from aerial spray applications.** *J. Econ. Entomol. 65(2): 590-592; 1972.* (10 references)

Vertical drift or upward loss of aerially applied sprays, was measured using cascade air samplers suspended from helium-filled weather balloons. Measurable quantities of the added fluorescent dye were collected from 1- to 150-foot altitudes 82 to 660 feet downwind. Generally the greater the altitude the less the drift, except at the station nearest application, where the greatest drift was detected in the highest sampler. Twenty-four percent of the drift spray volume was in the respirable particle size. In two tests the on-target deposits were 49.6% and 84.2%, the differences correlating with air movement during application. (Author abstract by permission)

72-1655. Nelson, D. C.; Smith, R. H.; Klosterman, H. J.; Quraishi, M. S. (Dept. of Biology and Entomology, North Dakota State U., Fargo, ND 58102). **2,4-D residues in tubers; texture and respiration of potatoes in storage.** *Amer. Potato J. 48(10): 366-373; 1971.* (7 references)

2,4-D is applied to red potatoes in order to intensify skin color, increase the proportion of medium size tubers, increase set, and improve yields and specific gravity. When 2,4-D was applied at the time of tuber set as recommended, and again one or two weeks later, the residues of the free acid recovered at harvest averaged 20 ppb in tubers treated at 2 oz/acre, and 60 ppb in tubers treated at 8 oz/acre. The residue levels at harvest were appreciably higher (110 ppb for the group treated at 8 oz/acre) when the application was made later. The 2,4-D values found following acid hydrolysis of the potato samples were two or more times greater than in non-hydrolyzed specimens, indicating that an appreciable amount of 2,4-D remains in the tubers in bound form. At the recommended treatment levels, 2,4-D had little effect on the respiration, specific gravity or texture of stored potato tubers.

72-1656. Sieczka, J. B.; Lisk, D. J. (Dept. of Vegetable Crops, Cornell U., Ithaca, NY 14850). **Arsenic residues in red clover.** *Amer. Potato J. 48(10): 395-397; 1971.* (10 references)

Sodium arsenite was used as a potato vine killer between 1940 and 1970, and arsenic residues accumulated in the soil where this practice was followed. To determine the possible contamination of animal products via fodder grown in crop rotation on such treated fields, the arsenic contents of red clover samples grown on 14 potato fields in 1969 were determined. Four samples from fields where potatoes were not grown were also analyzed, using the silver diethyldithiocarbamate method. The residue levels found ranged from 0.09 ppm (dry weight basis) to 0.84 ppm, and averaged 0.31 ppm. The samples obtained from fields without a history of sodium arsenite application averaged 0.18 ppm. The sample with the highest arsenic content was obtained from a field located 50 ft from a potato field boundary in the prevailing wind direction, and thus might have been contaminated by sodium arsenite spray drift from this field. If this value is excluded, the average for clover from treated fields is 0.25 ppm, thus insignificantly above the values for untreated fields. These values are far below those which could be expected to produce significant arsenic contamination of beef and milk from cattle consuming such fodder.

72-1657. Risebrough, R. W.; Florant, G. L.; Berger, D. D. (Dept. of Nutritional Sciences, Inst. of Marine Resources, U. of California, Berkeley, CA 94720). **Organochlorine pollutants in peregrines and merlins**

migrating through Wisconsin. *Can. Field-Natur. 84(3): 247-253; 1970.* (31 references)

Adipose tissue biopsy samples were collected from ten young (ca. 3-mo-old) peregrine falcons and seven merlins, trapped on the western shore of Lake Michigan during the fall migrations of 1968 and 1969. Samples were analyzed for organochlorine residues by a procedure allowing approximate quantitation of pesticides and PCB without prior separation. The ten peregrine samples contained 17.9 ± 12.3 ppm DDE, 0.23 ± 0.34 ppm *p,p'*-TDE, 0.71 ± 0.68 ppm *p,p'*-DDT, and 52.5 ± 32.2 ppm PCB. The seven samples analyzed for dieldrin contained an average of 0.40 ± 0.64 ppm, all values expressed on an extractable lipids basis. The low DDE residues in first year immature peregrines migrating from the Arctic presumably reflect both the age of the birds and lower levels of contamination in the prey species. The four adult merlins analyzed averaged 302 ppm DDE in the lipid fraction, and the average total-DDT concentration in these birds was 314 ppm. The PCB concentrations averaged 196 ppm. In the three immature merlins, DDE averaged 49.3 ppm, total-DDT 50.3 ppm, and PCB 28.6 ppm. PCB and DDE contents were significantly correlated.

72-1658. Lincer, J. L.; Cade, T. J.; Devine, J. M. (Cornell U., Section of Ecology and Systematics, Ithaca, NY 14850). **Organochlorine residues in Alaskan peregrine falcons (*Falco peregrinus* Tunstall), rough-legged hawks (*Buteo lagopus* Pontoppidan) and their prey.** *Can. Field-Natur. 84(3): 255-263; 1970.* (44 references)

DDE residue levels were measured in peregrine falcons, rough-legged hawks, their eggs, and representative prey species collected along the Colville River in northern Alaska in 1967. On an oven-dry weight basis, average DDE levels (and standard errors) for peregrine tissues (N = 3) were: egg, 131 ± 53.4 ppm; brain 58.2 ± 15.5 ppm; fat, 752 ± 225 ppm; muscle, 114 ± 27.6 ppm; and liver, 398 ± 78 ppm. The two peregrine ovaries available had average DDE contents of 1117 ppm. The DDE levels in roughleg hawk samples (N = 3) were egg, 7.07 ± 6.57 ppm; brain, 0.67 ± 0.48 ppm; fat, 13.3 ± 7.58 ppm; muscle, 1.21 ± 0.53 ppm. The single rough-legged hawk liver available contained 18.4 ppm DDE, and the single ovary from this species, 3.22 ppm DDE. In three willow ptarmigans, the DDE content of the pectoral muscle averaged 0.2 ppm, and the DDE contents of the pectoral muscles of a green-winged teal and a shoveler were 0.15 and 0.21 ppm respectively. These birds are considered representative of the peregrine falcon's prey. The whole-body DDE contents of the small mammals eaten by the rough-legged hawk averaged 0.3 ppm for the masked shrew, and 0.4 ppm for the Arctic shrew. Studies carried out in 1970 indicated that only 25% of the aeries on the Colville river were occupied by peregrine pairs successful in fledging young, while young ospreys were abundant.

72-1659. Temple, S. A. (Lab. of Ornithology and Div. of Biological Sciences, Cornell U., Ithaca, NY 14850). **Chlorinated hydrocarbon residues and reproductive success in eastern North American merlins.** *Condor 74(1): 105-106; 1972.* (9 references)

DDE residues in five unhatched merlin eggs collected from four different nests averaged 40.4 ppm. Subcutaneous fat biopsies taken from three breeding adult merlins contained an average of 267 ppm DDE. Of 136 prey remains found at merlin nests, three species, the gray jay, the robin and the savannah sparrow, comprised over half of the merlin's diet. Brain residues of DDE in these species averaged 0.24, 3.17, and 2.10 ppm respectively. For eggs collected in 1969, data was obtained on egg dates, clutch size, eggshell thickness, young per nest and % nests with young, and was compared with records of museum specimens dating before 1949. A significant reduction (9%) in eggshell thickness was found, and the number of young per nest apparently declined by about 25%. Embryonic mortality in 1969 appeared high, since all five eggs collected for analysis contained dead embryos.

72-1660. Anonymous. **BHC and DDT residues in human milk on the decline in Japan.** *Noyaku Bijinesu (Pestic. Business) 56: 458; 1972.* (Japanese)

Investigations on organochlorine pesticide residues in human milk were performed by the Japanese Science and Technology Agency and the Ministry of Welfare between November, 1971, and February, 1972. Specimens were collected in 36 prefectures, from areas where pesticide contamination was expected to occur. Results were compared with findings from a similar study conducted during the first four months of 1971. All of the samples tested (N = 398) contained β-BHC and DDT; 74.6% contained dieldrin; 5.5%, aldrin; and 1.0%, endrin. The β-BHC levels were higher in the milk of women from western Japan than in women from eastern Japan. The concentrations of DDT and β-BHC were higher in the milk of non-farm women than in farm women. The average β-BHC content of the milks tested was 0.096 ppm, as opposed to 0.1154 in the early 1971 study; DDT, 0.0562 ppm, compared to 0.0602 ppm before; dieldrin, 0.0031 ppm, compared to 0.034 ppm before; and heptachlor, 0.0011 ppm (not studied in early 1971).

72-1661. Damaskin, V. I. (Kherson Regional Sanitary and Epidemiological Station, Kherson, USSR). **Ob effektivnosti gigiyenicheskogo kontrolya za primeneniyem pestitsidov v sel'skom khozyaystve. [On the effectiveness of hygienic control over the use of pesticides in agriculture.]** *Gig. Sanit. 37(4): 114-115; 1972.* (Russian)

Residues of DDT were investigated in forage/fodder as well as in animal food products, produced in

an agricultural area. Milk contained 0.3-1.5 mg/l of DDT and more than 90% of all feed samples had DDT contents ranging from 0.1-1.2 mg/l. A direct relationship between DDT residues in forage/fodder and milk was determined. The DDT residues showed seasonal variations. A sharp decrease in the use of DDT resulted in a considerable decrease of the DDT contents in feed and food products alike. The DDT content in meat products decreased from 4.8 to 0.03 mg/kg, in dairy products from 4.7 to 0.08 mg/kg, in milk from 1 to 0.06 mg/l, and in grain from 0.98 to 0.01 mg/kg.

72-1662. Lewallen, M. J. (U.S. Dept. of Agriculture, Southern Piedmont Conservation Research Center, Watkinsville, GA 30677). **Pesticide contamination of a shallow bored well in the southeastern coastal plains.** *Ground Water 9(6): 45-49; 1971.* (8 references)

Toxaphene and DDT and its metabolites were monitored in soil samples, well water, and well bottom sediments for 4 yr following use of contaminated backfill in the construction of a shallow farm well. The well had neither concrete nor clay grout surrounding the casing. Contamination in the soil was highest near the surface and showed little downward movement. Contamination in backfill soil, which had been obtained from the sprayer washing area, remained constant down to 8 ft and was probably contaminated for the length of the well. Well bottom sediments contained the highest concentrations of pesticides. Initially these sediments were removed in large quantities. Movement of contaminated surface soil particles to the water table was probably responsible for the levels in the well. An equilibrium appeared to be established between the level in the water and that in the sediments, and concentrations were, in general, declining gradually by the end of the 4th yr.

72-1663. Menges, R. M.; Longbrake, T. D.; Tamez, S. (Agricultural Research Service, U.S. Dept. of Agriculture, Weslaco, TX). **Effect of soil incorporation on selectivity, movement, and persistence of herbicides in watermelon plantings.** *J. Amer. Soc. Hort. Sci. 97(2): 168-172; 1972.* (18 references)

Herbicides, individually and in combination, were used to control weeds in watermelon plantings under various soil incorporation and irrigation conditions. With increased rate of application and incorporation depth of herbicides, there was increased persistence of bensulide, benefin, and trifluralin. Laboratory bioassay data indicated that the activity of trifluralin in air-dry soil 4 hr after treatment was comparable to the theoretical activity. The volatility of trifluralin at high temperatures partially explains the increased activity recorded with increasing incorporation depth. The half-life of trifluralin was approximately 1 and 3 wk with 1.3 and 5.0 cm incorporation, respectively; only the 1.1 kg/ha application rate incorporated to 5 cm persisted even in trace quantities after 5 mo. No activity was found below the incorporation level, and trifluralin was moved up to the soil surface, presumably in the vapor state. Laboratory assays indicated more damage to plants at a given soil herbicide level than did the field studies, perhaps because the roots rapidly grew below the incorporation depth in field studies.

72-1664. Goursaud, J.; Luquet, F. M.; Casalis, J. (Laboratoire d'Industrie Laitiere, Douai, France). **Sur la pollution des laits de femme par les residus de pesticides dans les departements du Nord et du Pas-de-Calais. [Pesticide residue contamination of human milk in the northern provinces of France and Pas-de-Calais.]** *Lait 51(508): 559-567; 1971.* (5 references) (French)

Forty-nine samples of human milk were collected at the regional lactarium of the Institut Pasteur de Lille between January and October 1970 and analyzed for organochlorine pesticide contamination. All of the samples examined were contaminated to some degree. Dieldrin and heptachlor epoxide were present at less than 0.001 ppm. Hexachlorobenzene was present in some samples at 0.001-0.1 ppm. Hexachlorocyclohexane (BHC) isomers represented the major contaminant. The β-isomer was found in the largest quantities, between 0.01 and 0.2 ppm, while α-BHC generally accounted for 0.01 ppm or less, as did lindane. DDT was not determined in these milk samples. A high peak eluting from the gas chromatograph at the retention time anticipated for DDE was noted, but was not precisely determined in this study.

72-1665. Gruebner, P. (Pflanzenschutzamt beim Rat fuer Landwirtschaftliche Produktion und Nahrungsgueterwirtschaft des Bezirkes Dresden, Dresden, DDR). **DNOC Rueckstaende an Kartoffeln nach der Krautabtoetung mit Hedolit-Konzentrat. [DNOC residues on potatoes after halm destruction with Hedolit concentrate.]** *Nachrichtenbl. Pflanzenschutzdienst (DDR) 25(2): 31-34; 1972.* (9 references) (German)

Hedolit concentrate was applied to two potato fields, and DNOC residues in the potatoes determined 13 and 18 days later. The distance between rows in one field was 62.5 cm, and in the other, 75 cm. DNOC residues one day after application ranged from 0.42 to 0.92 ppm in exposed potato tubers and 0.28 to 0.40 ppm in soil-covered tubers. In most cases, the residues were below 0.05 ppm by the 15th day after treatment. The wider row spacing had an advantageous effect on the average residue level in the potato tubers, since residues were appreciably higher in the potatoes which were not covered by the soil, and the number of such exposed potatoes was appreciably lower in the wider-spaced field. In laboratory experiments involving direct application of a 1% aqueous DNOC solution to potato tubers, about one-sixth of the quantity recovered was found inside of the potatoes and the remainder in the peels.

72-1666. Heinisch, E.; Beitz, H.; Seefeld, F.; Lembcke, G.; Haussdoerfer, M.; Haselein, I.; Kirchner, K. (Biologische Zentralanstalt Berlin der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin, DDR). **DDT-, Lindan- und Toxaphen-Rueckstaende an Gras und Futterkulturen durch Abdriften nach Flugzeugeinsatz. [DDT, lindane and toxaphene residues on grass and forage crops due to drift after aerial pesticide application.]** *Nachrichtenbl. Pflanzenschutzdienst (DDR) 25(3): 53-59; 1971.* (15 references) (German)

Samples of grass and other forage were collected from 50 fields adjacent to areas where DDT, lindane and toxaphene formulations had been applied aerially to rape fields. Residues of DDT up to 70 ppm were found at distances of 1-100 m from the treated fields within the first three days after spraying. This quantity dropped to about one fifth of the initial value within 10-14 days. Meteorological conditions and plant growth had a great influence on the residue level. Lindane residues of about 10 ppm were found within the first three days after spraying of the rape fields, and decreased rapidly thereafter. The toxaphene residues found reached 80 ppm, and decreased by half within 1 mo. In all cases, maximum residue accumulation was not found in areas immediately adjacent to the treated field, but at some distance away (30-50 m). Although specimens were only collected up to a distance of 100 m, appreciable residues might have been present at greater distances. Forage contaminated in this manner and consumed by cows could give rise to heavy pesticide contamination of milk.

72-1667. Heinisch, E.; Zabel, E. (Biologische Zentralanstalt Berlin der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin, DDR). **Untersuchungen ueber Rueckstaende von Chlorkohlenwasserstoff-Insektiziden im Erfurter Feldgemuesebau. [Studies on residues of organochlorine insecticides in the vegetable-growing fields near Erfurt.]** *Nachrichtenbl. Pflanzenschutzdienst (DDR) 25(4): 74-78; 1971.* (15 references) (German)

Climatic and soil conditions around Erfurt are well suited for growing vegetables of the cabbage family, and particularly large amounts of cauliflower have been grown there over the years. Since 1960 insecticides, including DDT and lindane, have been increasingly used. Analyses for chlorinated hydrocarbons were made on 50 soil samples and 13 plant samples. Although the level of contamination was fairly low (trace-1 ppm DDT, trace-0.5 ppm lindane), these insecticides were present in the soil to a depth of 50 cm or more. The fairly uniform distribution of insecticides found in the 50-cm depth of loamy soil is explained by the intense watering (rainfall or irrigation) and tillage of the soil. The plant parts examined (cauliflower blossoms and leaves, spinach, celery, tomatoes and leeks) contained no detectable lindane residues, and from 0.005 to 0.1 ppm DDT.

72-1668. Santa Maria, H. C.; Bazzi, B.; Pogacnick, J.; Ayllon, R. A.; Galluzzi, G.; Sarli, C. A.; Nesti, V.; Vega, O. D. (Catedra de Terapeutica Vegetal de la Facultad de Agronomia de La Plata, Argentina). **Investigacion de residuos de Rogor en forrajes, carne y grasa de bovinos. [Investigation of residues of Rogor in forage, muscle and fat of cattle.]** *Rev. Fac. Agron. Univ. Nac. La Plata 46(2): 101-129; 1970.* (26 references) (Spanish)

Residue dynamics in fodder and the resulting contamination of beef were investigated following application of Rogor (dimethoate) to pastureland. A 40% dimethoate emulsion was applied to give 130 or 390 g of active ingredient per hectare. At the lower application rate, the dimethoate residue level in mixed forage samples decreased from 9.9 ppm immediately after treatment to 0.9 ppm within ten days. At the higher treatment level, the dimethoate content of 26.5 ppm initially present in the forage dropped to 1.5 ppm in ten days. Dimethoate residues in muscle, fat, and tongue specimens obtained from cattle grazing the treated pastures at 1, 2, 3, 5, 7, and 10 days after application were all below the limit of detection (0.004 ppm), except for one tongue specimen. This sample, obtained on the third day after treatment from one of the cattle grazing on the pasture treated at 390 g/ha, had a dimethoate content equal to the limit of detection.

72-1669. Koivusaari, J.; Laamanen, A.; Nuuja, I.; Palokangas, R.; Vihko, V. (Inst. of Biology, Dept. of Cell Biology, U. of Jyvaeskylae, Jyvaeskylae, Finland). **Notes on the concentrations of some environmental chemicals in the eggs of the white-tailed eagle and the osprey in the Quarken area of the Gulf of Bothnia.** *Work-Environ. Health 9(1): 44-45; 1972.* (10 references)

Two addled eggs from the white-tailed eagle and six addled osprey eggs were collected from nests in the Quarken area of the Gulf of Bothnia after the breeding seasons in 1970-1971. The mercury concentration in the two eagle eggs averaged 0.98 ppm; the DDE concentration, 172 ppm; and the PCB concentration, 157 ppm. In the osprey, the mercury concentration averaged 0.17 ppm; DDE, 15 ppm; and PCB, 25 ppm. Reproductive failures have been recorded among the white-tailed eagles in the Quarken area in recent years, but not among the ospreys, a fact which may be related to the concentrations of environmental contaminants.

72-1670. Herzel, F. (Institut fuer Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, 1 Berlin 33, Corrensplatz 1, Germany). **DDT und andere Insektizide in Berliner Boeden. [DDT and other insecticides in Berlin soils.]** *Z. Kulturtech. Flurbereinig. 12(5): 306-311; 1971.* (15 references) (German)

Soil samples were collected from 13 sites in and around West Berlin and analyzed for organochlorine pesticide residues. Six of the sites were more or less rural; three were suburban; and three were from the city. The

13th sample was collected from a fruit garden at Marienfeld. Soil samples were collected from the 0-5 cm and 5-20 cm soil layers at the first 12 sites. HCH isomers (mainly lindane) were present in many soil samples, but in small quantities (0-42 ppb). DDT and DDE were present in almost all of the samples, generally at less than 200 ppb. In contrast to HCH, which was present in upper and lower soil layers, DDT was found almost exclusively at the surface. Heptachlor and dieldrin were found in a few samples, and aldrin and heptachlor epoxide in one sample each. Chlorinated biphenyls appeared to be present in the samples from outlying districts, primarily in the lower soil layers, but confirmatory procedures could not be applied in this study.

72-1671. Klein, W.; Korte, F. (Institut fuer Oekologische Chemie, Schloss Birlinghoven, Organisch-Chemisches Institut der Universitaet Bonn, Bonn, West Germany). **Conversion of pesticides under atmospheric conditions and in soil.** In: *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo., 1972, pp. 71-80.* (1 reference)

Laboratory investigations were carried out to determine the final persistent products resulting from environmental degradation of organochlorine insecticides. It was recognized that laboratory results do not necessarily give an accurate picture of the environmental situation, and some observations were confirmed under field conditions. Photo-isomerization and some photodechlorination products of cyclodienes were identified. Several products of dieldrin having a substitution in the 4 position were observed. Irradiation of β-endosulfan produced a partial isomerization and a partial dechlorination at the methylene carbon atom. DDE yielded a number of different products depending on the conditions under which it was irradiated. A study of the hexachlorocyclohexane isomers indicated that technical BHC must be the source of the α- and β-isomers in foodstuffs. A successive dechlorination was observed in specific polychlorinated biphenyl components (PCB). Dechlorination also occurs in chlorthiamid. It was recommended that models of all types of environmental chemicals be studied for final persistent products.

72-1672. Adams, Jr., R. S. (Soil Science Dept., U. of Minnesota, St. Paul, MN). **Effect of soil organic matter on the movement and activity of pesticides in the environment.** In: *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo., 1972, pp. 81-93.* (54 references)

Research dealing with the influence of organic matter on organochlorines and triazine herbicides present in soil is reviewed. The interdependency of soil properties is stressed. Adsorption of the pesticides by soil organic matter, effect of organic matter on activity and persistence of the compounds, and mechanisms of adsorption by soil organic matter are discussed. There is a need for more work on the mechanisms of these phenomena, particularly on the chemistry of organic matter in relation to adsorption.

72-1673. Shaw, S. B. (Biology Dept., Community College of Philadelphia, Philadelphia, PA 19107). **DDT residues in eight California marine fishes.** *Calif. Fish Game 58(1): 22-26; 1972.* (14 references)

DDT, DDE and TDE were analyzed in the liver and flesh of petrale sole, English sole, and Pacific sanddabs collected from Monterey Bay; sablefish, lingcod, white croaker and roughscale rattail caught by longline off central California; and jack mackerel caught off Southern California. Flesh samples were taken from the lateral region and included skin and adipose tissue. DDT and its derivatives were present in all of the samples analyzed. Highest total-DDT residues were found in sanddab (13 ppm), roughscale rattail (7.9 ppm), sablefish (6.9 ppm), and English sole (6.1 ppm). Highest levels of DDE occurred in sanddab (10 ppb); TDE was highest in jack mackerel (1.4 ppm); and *p,p'*-DDT was highest in roughscale rattail (2.2 ppm). The ratios in flesh were similar to those found in livers, but the total quantities were smaller. The highest total-DDT residues were found for sablefish (6.28 ppm), roughscale rattail (4.72 ppm), and petrale sole (1.69 ppm). The highest DDE level was found in sablefish (5.5 ppm), and the highest levels of TDE (0.31 ppm) and *p,p'*-DDT (1.5 ppm) in the roughscale rattail. Total organochlorine pesticide residues (mainly DDT and its derivatives) were highest in the benthic feeders.

72-1674. Wassermann, M.; Nogueira, D. P.; Tomatis, L.; Athie, E.; Wassermann, D.; Djavaherian, M.; Guttel, C. (Dept. of Occupational Health, Hebrew U.-Hadassah Medical School, Jerusalem, Israel). **Storage of organochlorine insecticides in people of Sao Paulo, Brazil.** *Ind. Med. 41(3): 22-25; 1972.* (12 references)

Adipose tissue specimens were collected during surgery from 114 patients without known occupational exposure to pesticides at Sao Paulo hospital in 1969-1970 and analyzed for organochlorine residues. In 28 stillborn fetuses, the total DDT content averaged 2.25 ppm, of which 0.5 ppm was *p,p'*-DDT, and 1.43 ppm was *p,p'*-DDE. All other insecticide levels surveyed were below 0.2 ppm. In 17 persons 5-24 years old, the total DDT content averaged 2.7 ppm, of which DDE constituted 58%. In the 25-44 age group (38 persons), total DDT averaged 7.9 ppm, and DDE represented 67% of this. The mean total DDT-derived material in the age group 45 yr and over (31 persons) was 4.1 ppm, of which 60% was DDE. The β-BHC level was the highest in the 25-44 age group, averaging 0.25 ppm; this group also contained the most dieldrin, 0.13 ppm. The heptachlor epoxide level was the highest in the stillborn fetuses,

0.07 ppm. The apparent storage peak of organochlorine insecticides in the 25-44-yr-old males suggests differences in exposure and/or detoxication according to age and sex.

See also **72-1588** **72-1749** **72-1761** **72-1791** **72-1780** **72-1799** **72-1806** **72-1675** **72-1652** **72-1777** **72-1792** **72-1781** **72-1802** **72-1810** **72-1727** **72-1756**

72-1675. Durham, W. F.; Wolfe, H. R.; Elliott, J. W. (Wolfe: Wenatchee Research Station, Evironmental Protection Agency, PO Box 73, Wenatchee, WA 98801). **Absorption and excretion of parathion by spraymen.** *Arch. Environ. Health 24(6): 381-387; 1972.* (28 references)

Significant amounts of the urinary metabolite *p*-nitrophenol were detected in the urine of spraymen as long as ten days after last exposure to the organophosphorus insecticide, parathion. Approximately two days after exposure, excretion was insignificant during late night and early morning hours, but reached higher levels during midday. The height of immediate postexposure excretory peaks and the dealyed midday rises in excretion seemed to vary directly with the temperature. Bathing after exposure was associated with a rapid decrease in *p*-nitrophenol excretion. Tests considering only one route of exposure at a time indicated that the dermal route represents a potentially greater source of absorption than the respiratory route for orchard spraymen using liquid parathion formulations under the conditions of this study. However, with equivalent absorbed dosages the respiratory route is the more hazardous. (Author abstract by permission)

72-1676. Wolfe, H. R.; Armstrong, J. F.; Staiff, D. C.; Comer, S. W. (Wenatchee Research Station, Environmental Protection Agency, PO Box 73, Wenatchee, WA 98801). **Exposure of spraymen to pesticides.** *Arch. Environ. Health 25(1): 29-31; 1972.* (5 references)

Values for potential dermal and respiratory exposure, and for total exposure in terms of fraction of toxic dose were determined for 11 different pesticides during orchard spraying with air-blast application equipment. Highest total exposure was calculated to be only 1.12% of a toxic dose per hr for workers applying the organophosphorus compound, carbophenothion, the most toxic compound in the study. There was considerable variation in exposure to a specific pesticide depending on certain factors, mainly wind. Potential dermal exposure to each compound was much greater than potential respiratory exposure. Workers were subjected to relatively small fractions of a toxic dose each day as they applied the compounds that were studied. (Author abstract by permission)

72-1677. Guthrie, F. E.; Tappan, W. B.; Jackson, M. D.; Smith, F. D.; Krieger, H. G.; Chasson, A. L. (Dept. of Entomology, North Carolina State U., Raleigh, NC 27607). **Cholinesterase levels of cigar-wrapper tobacco workers exposed to parathion.** *Arch. Environ. Health 25(1): 32-37; 1972.* (17 references)

Following reports in 1970 that parathion is hazardous to tobacco workers even though label instructions have been followed, the cholinesterase levels of 44 individuals were monitored during the 1971 harvesting season in the cigar-wrapper district of Quincy, Fla. Despite contact with parathion residues, as shown by appearance of *p*-nitrophenol in urine and up to 5 ppm of toxicant on leaves, no member of the harvesting teams on the three farms examined showed any evidence of significant depression of red blood cell cholinesterase, although one worker had slight inhibition of plasma cholinesterase. (Author abstract by permission)

72-1678. Funazaki, Z. (Saku General Hospital, Usudamachi, Nagano Prefecture, Japan). **[Teratogenicity of 2,4,5-T.]** *Baioteku (Biotech) 3(6): 464-470; 1972.* (13 references) (Japanese)

Evidence for the teratogenicity of 2,4,5-T is reviewed. The use of 2,4,5-T in Japan for clearing broad-leafed weeds and shrubs in forests was stopped in 1971 because of its presumed toxicity and teratogenicity; however, the latter is still disputed, especially by the manufacturers. The author was part of a team which studied the effects on humans of 2,4,5-T used for defoliation in Vietnam. Out of a group of 19 adult women living in an area which received defoliation treatments for 2 mo, three of the four pregnant women delivered malformed babies. Two of these newborns displayed trisomy of the leukocyte chromosomes and there were structural abnormalities in 13% of the chromosomes. Structural anomalies of leukocyte chromosomes were also observed in some of the mothers (7.6%, compared to 1.4% in persons living in North Vietnam, where no 2,4,5-T has been applied). Although a direct causal relationship with herbicide application has not been established, the incidence of cleft palate and spina bifida has increased sharply since 1966, when intensified defoliation was begun. Disagreement also exists concerning the degradation of 2,4,5-T in soil. Whereas previous studies reported complete degradation within 3 mo, the author found that about one-tenth of the quantity applied remained after one year.

72-1679. Nishimura, H. (School of Anatomy, Faculty of Medicine, Kyoto U., Kyoto-shi, Japan). **[Teratogenic substances.]** *Iden (Heredity) 26(5): 19-22; 1972.* (Japanese)

The teratogenic properties of synthetic chemicals are reviewed. In the Japanese literature, two reports have appeared concerning teratogenesis in man and exposure to pesticides. In 1965, Ogi reported on a presumed relationship between abortion or limb malformations in children and mothers' exposure to organophosphate pesticides (occupational contact). In 1967, Nora described two cases of malformations in the newborn children of 50 mothers who were exposed to pesticide contamination during the first 4 mo of pregnancy. Reports of the teratogenic or fetotoxic properties of specific pesticides on the following animal species have also appeared in the literature: DDT (mouse and rat); dieldrin (mouse and rat); endrin (mouse); chlordane

(rat); kepone (mouse); 2,4,5-T (mouse and rat); Kelthane (mouse); parathion (mouse and rat); diazinon (rat); tepa (rat); Metepa (rat); carbaryl (guinea pig and dog); thiram (hamster); 2,4-D (rat); malathion (rat) and apholate (rat and sheep).

72-1680. Mattocks, A. M.; El-Bassiouni, E. A. (School of Pharmacy, U. of North Carolina, Chapel Hill, NC 27514). **Peritoneal dialysis: a review.** *J. Pharm. Sci. 60(12): 1767-1782; 1971.* (274 references)

The history, physiology, variations of technique, kinetics, clinical applications and problems of peritoneal dialysis are discussed. Along with its use in renal failure and removal of endogenous poisons, peritoneal dialysis can be used for removal of exogenous poisons, particularly when an artificial kidney is not available for hemodialysis. Apparatus is simple, but the method is not as rapid as hemodialysis. It has been found useful in conjunction with calcium sodium edetate or dimercaprol for treatment of lead or mercury poisoning, respectively, and alone for treatment of sodium chlorate poisoning.

72-1681. Takano, Y. (Pesticide Poisoning Research Group of Akita Prefecture, Akita Prefecture, Japan). **[Results of clinical investigations of pesticide poisoning, 1967-1969.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 369; 1971.* (Japanese)

Statistics on pesticide poisoning in Akita Prefecture were collected beginning in 1967 and principal findings were reported for 1967 to 1969. Of the 80 cases recorded, the majority involved females. When various pesticide types were ranked according to number of cases they had caused, the organophosphates were first on the list in 1967, second in 1968, and third in 1969. Organochlorines were fourth in 1967, third in 1968, and second in 1969. Over the years there was an increase in the number of cases resulting from contacts other than those involving application; the number of poisonings due to suicidal and accidental ingestion decreased. More incidents of skin and eye injuries due to pesticides were reported in 1969 than in previous years.

72-1682. Kudo, N. (Kudo Hospital for Internal Medicine, Aomori Prefecture, Japan). **[Symptoms of pesticide poisoning. Part 6. Reexamination of serum ChE activity and clinical picture in poisoned patients.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 369-370; 1971.* (Japanese)

Organophosphate pesticides have been heavily applied in the apple orchards of the Hirosaki region, Aomori prefecture. To detect the existence of chronic organophosphate poisoning in this region, the serum ChE activities of residents were surveyed, taking an activity level of less than 0.6 ΔpH/min as the pathological borderline. The percentage of individuals with values below this level was significantly elevated for rural inhabitants and pesticide applicators. In farmers and their wives serum ChE levels below the normal boundary were found most frequently during the pesticide application season. Although the cholinesterase depletion was generally reversed during the winter, a prolongation to the next planting season sometimes occurred. A high incidence of symptoms such as malaise, cholinesterase depression, angina pectoris, and depressions of the α-fraction of serum protein was recorded in persons with more than ten yr occupational contact with organophosphate pesticides. Liver malfunctions were not detected.

72-1683. Tosa, Y.; Yasugi, N.; Okada, N.; Nagami, H.; Seki, R. (Ehime Center for Rural Medicine, Ehime Prefecture, Japan). **[A case of survival in endrin poisoning.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 370-371; 1971.* (Japanese)

A 60-yr-old farmer was hospitalized with headache and nausea one day after spraying his persimmon orchard with endrin (10 ml of 19.5% EC in 18 l. of water) over a 1-hr period. He was wearing a gauze mask but no goggles, gloves or waterproof clothing. His symptoms on admission were: disturbance of consciousness, agitation, sweating, urinary incontinence, myofibral contractures on lips and upper extremities, blood pressure 180/110, delayed light reflex, and hyperactive tendon reflex. Despite timely administration of analgesics, antispasmodics, respiratory stimulants, cardiotonics and adrenal cortical hormone as well as continuous drip infusion of glucose, hepatinics and vitamins, the symptoms worsened at first. However, gradual recovery occurred during the 15 days which followed, although some symptoms persisted almost until the time of discharge from the hospital after 43 days. Elevations of urine protein and sugar, erythrocyte sedimentation rate, icterus index and SGOT values were recorded during the first 15 days. The delayed onset of symptoms, extension of myofibral contractures over the entire body, miosis, accentuation of tendon reflex and delayed acceleration of erythrocyte sedimentation rate are unusual features in this type of case.

72-1684. Watanabe, S. (Watanabe Hospital for Internal Medicine, Aomori Prefecture, Japan). **[Medical observation on pesticide poisonings with dermatitis as the chief complaint.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 371; 1971.* (Japanese)

Medical examinations were administered to persons complaining of "skin rash" due to pesticides. In reporting findings, primary emphasis was placed on those cases resulting from difolatan poisoning (*N*-tetrachloroethylthio-tetrahydrophthalimide), which is used to control *Alternaria* blight on apples. Dermal symptoms of the selected cases were generally severe. Many of the patients were found to have internal disorders such as hypertension (especially in the case of marked edema),

protein and urobilinogen in the urine, liver function depression, anemia, and depressed ChE activity, generally paralleling the severity of the dermatitis. Therapy for dermatitis due to difolatan should take into account the possibility of internal disorders.

72-1685. Sugaya, T. et al. (Akita Society of Rural Medicine, Akita Prefecture, Japan). **[Investigation of the actual incidence of pesticide poisoning, based primarily on medical examinations of cooperative groups.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 374; 1971.* (Japanese)

Medical examinations were performed on 213 persons from several cooperative pesticide application groups in 1969. Of the persons examined, 26.1% to 47.4% manifested some symptoms, and 17.9 to 48.4% of these symptoms were considered the result of pesticide contact. The average percentage of persons exhibiting symptoms in these cooperatives was lower than that found nationally for similar groups, which was 42.3%. The percentage of persons displaying symptoms was highest among herbicide applicators, followed by applicators of organochlorines, low-toxicity organophosphates, and antimicrobials. Prior to the banning of parathion, the organophosphates had figured most prominently in the development of both symptoms and outright poisoning. During the pesticide application season, the urine PNP (paranitrophenol) levels of 23% of the test subjects changed from normal to abnormal, whereas 15% showed the reverse change. The trend in serum ChE activity was similar. Approximately 10% of the persons examined displayed reduced erythrocyte and hemoglobin levels, and about 5%, reduced hematocrit, blood specific gravity and serum protein values. Some abnormalities were noted in the urinalyses, e.g., protein, sugar and urobilinogen in the urine.

72-1686. Izumiyama, T. et al. (Hokushin General Hospital, Nagano Prefecture, Japan). **Investigation into the actual incidence of pesticide poisoning in fruit-growing regions.** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 374-375; 1971.* (Japanese)

Variations in the incidence of pesticide poisoning between 1966 and 1969 were traced in 280 inhabitants of a farm village, where 71% of the land surface was devoted to fruit cultivation (mainly apples). The percentage of persons displaying symptoms of pesticide poisoning decreased from 26% in 1967 to 20% in 1969; however, the risk of pesticide contact increased, as the number of days involved in pesticide application rose from 32 in 1967 to 39 in 1969. The percentage of persons exhibiting symptoms due to contact with organophosphates dropped from 25 in 1966 to 4.5 in 1969, whereas the percentage with symptoms of organochlorine contact increased from 5 to 13 in the same period. The number of incidents of dermal injury out of the total number of pesticide contact incidents was 51/237 in 1966, 77/131 in 1968, and 53/99 in 1969. The largest number of dermal symptoms was due to difolatan. Diazinon and nicotine sulfate were the most frequently applied pesticides (760 and 245 applications respectively).

72-1687. Uchida, A.; Tohdoh, M.; Kondoh, M.; Nakamura, K.; Sohda, T.; Unno, I.; Muramatsu, T.; Ohba, Y.; Nozue, I.; Uchiyama, J.; Eda, S. (Inst. of Rural Medicine, Chiba U., Chiba-shi, Japan). **[Results of field investigation of pesticide application and poisoning in the citrus growing region of Shizuoka prefecture.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 375-376; 1971.* (Japanese)

The results of a year-long study of pesticide application, occurrence of pesticide poisoning and medical examinations of pesticide applicators in a village of the citrus growing region are presented. The test subjects included 44 men and 42 women from 33 families, all of whom had varying contact with pesticides in the course of the year. The average number of days engaged in pesticide application was 25 for the men and 18 for the women between April and December. Frequently used pesticides included calcium polysulfides, calcium polysulfides plus zinc sulfate, dithane, kelthane, petroleum distillates, Bordeaux mixture, dimethoate, and delan. About 27% of the men and 19% of the women showed some symptoms due to pesticide contact, the highest contact being found in the 30 to 40 age group. The most frequent symptom was skin rash occurring in 17 cases, followed by eye irritation (hyperemia and pain) in 7 cases. Cholinesterase activities below 0.8 were found in 35.7% of the male workers tested in August and 42% in March, and in 43% of the female workers in August and 37% in March. Elevated SGOT values and anemia were also recorded.

72-1688. Dacre, J. C.; Scott, D. (Toxicology Research Unit, Medical School, U. of Otago, Dunedin, New Zealand). **Possible DDT mortality in young rainbow trout.** *N. Z. J. Mar. Freshwater Res. 5(1): 58-65; 1971.* (14 references)

Excessive exposure to DDT seemed responsible for the unusally high mortality rates found among the eggs and fry of rainbow trout obtained from Lake Taupo stock in 1966. The mean concentration of total DDT was found to be 4.63 ppm. Both the mortality rates and DDT levels in this group were significantly higher than in trout from other stocks, which were also maintained in the same lake. This case seemed similar to possible DDT poisonings in young salmonids in New Zealand and North American. It is likely that the high DDT levels were passed from parent to progeny.

72-1689. Ember, M.; Mindszenty, L.; Rengei, B.; Csaszar, L.; Czina, M. (Inst. of Public Health and Conta-

gious Diseases of Szeged, Szeged, Hungary). **Secondary vitamin A deficiency in organophosphate formulators and spray workers.** *Res. Commun. Chem. Path. Pharmacol. 3(1): 145-154; 1972.* (10 references)

Three groups of individuals were occupationally exposed to organophosphates, including 8 non-agricultural spray workers, 14 agricultural spray operators, and 6 industrial workers; for all there was a decrease in serum vitamin A levels which paralleled a decrease in cholinesterase (ChE). When both groups of spray workers were removed from contact with organophosphate pesticides, there was an immediate rise in both ChE and vitamin A levels. The industrial workers, namely formulators and reactor operators, were in direct contact with material containing 80-90% dichlorvos. The decrease in ChE and vitamin A correlated with the lack of proper preventive measures: use of rubber gloves through which dichlorvos could penetrate, and lack of proper ventilation. When these workers were removed from contact with dichlorvos both vitamin A and ChE rose slightly, but did not return to normal levels. In no cases did any of the workers display any overt symptoms of organophosphate poisoning.

72-1690. Wolff, F.; Gellert, P.; Kieckhoefel, U. (Bezirksinspektion Gesundheitsschutz in den Betrieben beim Rat des Bezirkes Neubrandenburg, 20 Neubrandenburg, DDR). **Chemische Noxen in der Landwirtschaft im Spiegel der Berufskrankheitsgeschehens eines Agrarbezirkes. [Chemical noxae in agriculture in the light of the occupational disease pattern of an agrarian region.]** *Z. Gesamte. Hyg. 18(3): 174-177; 1972.* (18 references) (German)

Although general occupational illnesses declined in the Neubrandenburg region of East Germany between 1960 and 1970, there was an increase in those caused by contact with agricultural chemicals. During this 10-yr period, 22 acute intoxications and 68 cases of severe dermatitis were officially recognized as occupational illnesses due to contact with agricultural chemicals. Of the 22 acute intoxications, 9 were due to phosphorus and its compounds (e.g., phosphate esters and phosphine), 1 to mercurials, 9 to nitro or amino compounds of benzene and its homologs (e.g., DNOC), 2 to halogenated hydrocarbons, and 1 to hydrogen sulfide. Of the 68 dermatitis cases, 20 were due to plant or wood protection agents and the remainder to disinfectants, petroleum products and other substances. Most of these incidents could have been avoided by following safety recommendations. The numbers reported underestimate the problem, especially in cases where the physician in charge lacks interest or awareness in matters of occupational safety.

72-1691. Pietsch, R. L.; Bobo, C. B.; Finklea, J. F.; Vallotton, W. W. (Box 3802, Dept. of Ophthalmology, Duke U. Medical Center, Durham, NC 27706). **Lens opacities and organophosphate cholinesterase-inhibiting agents.** *Amer. J. Ophthalmol. 73(2): 236-242; 1972.* (34 references)

Three groups of people who were being treated intraocularly with various regimens of echothiophate iodide for glaucoma and esotropia and one group of organophosphate pesticides users, consisting of farmers, applicators, and formulators, were interviewed, tested for blood glucose, urea, nitrogen, and plasma and red cell cholinesterase, and observed. An increase in lens changes following administration of 0.25% echothiophate was seen after 4 mo of therapy, especially in patients with depressed red blood cell and plasma cholinesterases. In the 60 heavily exposed pesticide workers, no biochemical abnormalities were noted. One posterior subcapsular cataract and two early posterior cortical cataracts were recorded in these subjects. Cortical wedging was observed in 9 of the 23 farmers examined, 7 of 19 formulators, (the median ages in these groups were 38 and 44 years, respectively), and in 18% of the applicators.

72-1692. Scanlon, J. (Boston Hospital for Women, Lying-in division, Boston, MA 02115). **Human fetal hazards from environmental pollution with certain nonessential trace elements.** *Clin. Pediat. 11(3): 135-141; 1972.* (41 references)

In a review on the sources and effects of trace metals in the fetus, the mercury hazard is cited. Animal studies have indicated that organic mercury compounds are transferred across the placenta and accumulate in fetal tissues. Neurological abnormalities were accompanied by high mercury levels in brain, liver, and kidneys of newborns affected with Minamata disease. A pregnant woman from a New Mexico family was poisoned by eating pork containing high mercury levels due to the use of grains treated with mercurial seed dressings as hog feed (see Abstract No. 71-1650 and 72-0536). Her newborn child displayed severe tremors for several days, and his urinary mercury level during the first days of life was 2.7 ppm. Hypotonicity and irritability developed at about six weeks of age, followed by the manifestation of myoclonic seizures, ocular malfunctions, and severe retardation. The intrauterine origin of the mercury poisoning was supported by the fact that the child was never breast fed.

72-1693. Imaizumi, K.; Atsumi, K.; Mita, K.; Miyashita, H. (Dept. of Ophthalmology, School of Medicine, Iwate Medical U., Iwate, Japan). **[Ophthalmologic and systemic syndromes observed in farmers with long exposure to agricultural chemicals.]** *Nippon Ganka Kiyo (Folia Ophthalmol. Jap.) 22(11): 259-263; 1971.* (15 references) (Japanese)

Ophthalmologic and systemic medical examinations were performed on 164 farmers all of whom had been handling agricultural chemicals for over 20 yr.

Among these chemicals were organic mercurial fungicides, chlorinated hydrocarbons, and organophosphates. Most of the subjects complained of headache, vertigo, numbness of the limbs, or blurred vision. Systemic examination revealed a markedly decreased cholinesterase level and *p*-nitrophenol was detected in the urine of more than half the subjects. Ophthalmologic examination demonstrated constricted visual fields in 24.8% of the subjects, accomodative disturbances in 29.4%, and abnormalities of the optic nerve in 9.8%. It is presumed that these symptoms are due to chronic exposure to agricultural chemicals.

72-1694. Araki, S.; Ushio, K.; Iwabuchi, T. (Tokyo Rosai Hospital, Ohta-ku, Tokyo, Japan). **[A case history and autopsy findings in acute poisoning by the herbicide, Gramoxone.]** *Nippon Saigai Igakukai Kaishi (J. Jap. Accident Med. Ass.) 20(1): 43-44; 1972.* (11 references) (Japanese)

A 29-yr-old woman from a farming family swallowed a mouthful of Gramoxone (26% paraquat formulation) with suicidal intent. She was hospitalized following gastric lavage, 30 min. after ingestion. Symptoms were severe stomatodynia, repeated vomiting and aggravated erosions and ulcers of the oral cavity and pharynx. By the 6th day after ingestion, clinical findings were flushed face, dry skin, temperature 38.6°C, pulse rate 70/min, blood pressure 100/70, moderately accelerated respiration, jaundice of palpebral and ocular conjunctiva, readily bleeding white coating on mucous membranes of lips, tongue, and pharynx; cyanosis of lips, and slight bubbling rales audible over lower back on both sides. Laboratory findings were: ESR 85 mm/hr, Hb 92%, Ht 46%, RBC 433 X 10^4, WBC 7400, toxic granulocytes (+), urine s.g. 1.021, protein (+), sugar (−), urobilinogen (++), epithelial cells in sediment (+), GOT 146 U, GPT > 200 U, etc. A chest x-ray indicated inflammatory changes in lower pulmonary lobes. Death occurred on the 12th day after poison ingestion, due to hypotension, despite tracheotomy on the 8th day. Autopsy findings were: severe icterus, bile embolisms and fatty degeneration at centers of hepatic lobules, edema of stroma in renal cortex, increase of cellular constituents in lamina propria of stomach, and regeneration of epithelium at gastric fundus. The delayed course in this case was unusual.

72-1695. Ohishi, S. (Dept. of Ophthalmology, Ehime-Rosai Hospital, Matsuyama-shi, Ehime Prefecture, Japan). **[High incidence of blindness of cattle in Ehime Prefecture: discussion of causal relationship to pesticide poisoning.]** *Nippon Saigai Igakukai Kaishi (J. Jap. Accident Med. Ass.) 20(4): 191-194; 1972.* (14 references) (Japanese)

A high incidence of blindness, generally of both eyes, was noted in cattle of Ehime prefecture within the past three years. To determine the etiology of this blindness, a series of observations was made on 69 cases out of a stock of 495 young Holsteins on three ranches in Niihama District, Ehime Prefecture. The serum carotene level in the blind cattle represented only 7% of that in normal cattle, and the liver carotene amounted to less than 1% of normal. The serum vitamin A level was 25% of normal, and liver vitamin A, 0.5% of normal. Holstein cattle seem especially sensitive to vitamin A deficiency. The principal characteristics of such blindness were: conspicuous atrophy of the sphincter of the pupil, absence of the direct reflex, papilledema, constriction of the nerve sheath due to thickening of the dura matter, and abnormal bone growth. The resulting blindness seemed to be caused by compression of the optic nerve, leading to atrophy, and vitamin A deficiency, rather than organophosphate or carbamate pesticide poisoning, as originally presumed. The farms in question had no history of pesticide application.

72-1696. Sandifer, S. H.; Keil, J. E. (Medical U. of South Carolina, Charleston, SC 29401). **Pesticide exposure: association with cardiovascular risk factors.** *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo., 1972, pp. 329-334.* (9 references)

Thirty volunteers were intensively exposed to pesticides and correlations were studied between pesticide exposure, cardiovascular risk factors and medical and family history; a group of 30 control subjects matched for age, race, sex, and physical activity was used for comparison. In the 30 exposed volunteers there were significant elevations in systolic and diastolic blood pressure, cholesterol, total lipids and DDT levels in plasma. The mean weight was the same for both groups. When analyzed separately by race, the data for non-whites showed effects in most parameters, but only total plasma lipids and DDT showed significant differences in whites. Interviews with subjects revealed no difference between controls and exposed subjects or between races in smoking, history of diabetes, heart attack or hypertension, use of prescription drugs, or educational level.

72-1697. Scheid, W. (Universitaets-Nervenklinik, Cologne, Germany). **Toxische Polyneuritiden. [Toxic polyneuritis.]** *Med. Welt 21(6): 203-210; 1970.* (9 references) (German)

The causes and diagnostic peculiarities of various forms of toxic polyneuritis are reviewed. Out of 856 cases of polyneuritis treated in-hospital at Cologne between 1950 and 1969, 54 (6.3%) were caused by thallium. Most of these cases represented suicide attempts involving rat poisons. The symptoms of acute thallium poisoning generally begin within 4 hours after poison ingestion, and constitute severe pain, paresthesia, and hyperpathia, leading to paresis; reflexes are generally retained. The clinical picture of poisoning by tricresyl phosphate and other triaryl phosphates is dominated by

motor dysfunction. This type of poisoning is no longer as common as it was before and during the Second World War. Paresthesia and paresis are centered in the muscles of the calf and foot. Severe trophic disturbances of the skin interfere with the determination of skin sensitivity. The mass poisoning incident in Morocco in 1969 suggests that triarylphosphate poisoning should be the first diagnosis considered when polyneuritis appears in an epidemic-like fashion. It has also been suggested that insecticides such as DDT can cause polyneuritis, but sufficient evidence is not available to support such a conclusion.

72-1698. Preussmann, R. (Deutsches Kresbsforschungszentrum, Institut fuer Experimentelle Toxikologie und Chemotherapie, Heidelberg, Germany). **Krebsgefaehrdung durch Fliegenfaenger. [Cancer threat of anti-fly strips.]** *Med. Welt. 22(46): 1862; 1971.* (4 references) (German)

In response to a query from a reader, the possible hazards of dichlorvos-impregnated fly strips are reviewed. Animal experiments aimed at determining the cancer threat posed by dichlorvos vapors have not yet been carried out, so that the cancer threat to humans remains to be evaluated. However, some studies have indicated that a chronic toxic effect may exist. Dichlorvos behaves chemically like a typical alkylating agent. It methylates DNA at guanine residues *in vitro*, a behavior analogous to that of several potent chemical carcinogens such as dimethylsulfate or dimethylnitrosamine. A phosphate ester of similar structure has been reported to cause dominant lethal mutations in mice. In any case, the use of dichlorvos-impregnated strips in closed rooms seems questionable because of the possibility of cholinesterase inhibition.

72-1699. Oarda, M. (Spitalul de Urgenta, Bucharest, Rumania). **Considerations etiologiques, cliniques et therapeutiques concernant 276 intoxications par le parathion. [Etiology, clinical and therapeutical considerations concerning 276 cases of parathion poisoning.]** *Arh. Hig. Rada Toksikol. 22(1): 33-35; 1971.* (6 references) (French)

276 Parathion poisoning cases were treated during a seven yr period in Bucharest, of which 57.9% were accidental and 42.10% were intentional. Most accidents resulted from ingestion of recently sprayed fruit and from improper handling of pesticides when used in the home or for clothing treatment. The majority of parathion poisoning accidents occurred during the summer, and 58% of the victims were from rural areas. Determinations of serum cholinesterase activity were made in 119 cases; 45 of these had enzyme activities amounting to 5-10% of the normal level, 32 had 15-20% of normal activity, and 42 patients had 30-40% of normal activity. There was no relationship between severity of poisoning and drop in cholinesterase activity. Paranitrophenol was detected in the urine of 72% of the cases; this was one of the diagnostic measures used to confirm parathion poisoning. Of the 104 patients treated with atropine alone, 13 died. Mortality was reduced by a treatment involving a combination of atropine with toxogonin or PAM. Early interruption of such treatment must be avoided, as this can cause reoccurrence of pulmonary edema or respiratory arrest.

72-1700. Virtamo, M. (Tyoeterveyslaitos, Helsinki 29, Finland). **Kemialliset haittatekijaet ja niistae aiheutuvat terveysvaarat mekaanisessa puunjalostus-teollisuudessa. [Harmful chemical substances and the health hazards caused by them in the mechanical woodworking industry.]** *Pap. Puu 53(11): 657-663; 1971.* (Finnish)

Fungicides and insecticides used for the treatment of wood and wood glues may enter the body via the respiratory tract and through the skin. The chemical types used include inorganic, organochlorine, organophosphate, cresotol, and related compounds. Among the organochlorines, acute intoxications resulting in death have occurred due to contact with pentachlorophenol. Symptoms of pentachlorophenol (and tetrachlorophenol) poisoning include eye and respiratory irritation, accelerated breathing and heart rate, a rise followed by a drop in blood pressure, muscular weakness, and elevated temperature. Chronic exposure results in kidney and liver damage. Lindane, aldrin, and dieldrin have been used as insecticides in woodworking. Symptoms of poisoning by these substances include nausea, diarrhea, tremors, muscular weakness, and dyspnea. Prolonged exposure to dieldrin can cause liver damage. Parathion, used as an insect poison in some polywood glues, can cause poisoning by inhalational or dermal exposure. Its symptoms are those of general cholinesterase inhibition, and it affects the central nervous system. Polychlorinated biphenyls and polychlorinated naphthalenes, which have a wide variety of industrial uses, are highly persistent in the environment, but their toxic effects are not known.

72-1701. Sect. of Labor Hygiene, Div. of Safety and Hygiene, Japan Ministry of Labor. (Chiyoda-ku, Tokyo, Japan). **[Case histories of occupational disease. Poisoning ascribed to an organophosphorus pesticide.]** *Rodo Eisei (Jap. J. Ind. Hyg.) 13(6): 52-54; 1972.* (1 reference) (Japanese)

Two cases of acute poisoning due to intake (oral, dermal, and inhalational) of a 1.5% dust formulation of Hinosan in a pesticide manufacturing plant are described. Following the production of a batch of Hinosan formulation, one male worker (age 48) and one female worker cleaned the apparatus, particularly the bin in which the Hinosan had been stored, each wearing a mask, ordinary work clothes, and a cap. Fresh air was provided in the bin, but air hoses were not long enough to reach the workers. During the cleaning operation, the

man began to feel ill, with symptoms of headache, abdominal pain, vomiting, diarrhea, and numbness of the extremities. He consulted a doctor, who diagnosed the case as acute poisoning, administered atropine, and prescribed 4 days of rest. The patient's previous record indicated the possibility of chronic poisoning, since his serum cholinesterase activity was 50% of normal. The woman felt ill upon going home after work; her symptoms were similar to her coworker's. She recovered after two days of rest. Factors contributing to poisoning in these cases were the beating of the bin sides to remove adhering material, which released pesticide dust into the air; excessive mesh size of the masks, which permitted the passage of 300-mesh particles; inadequate protective clothing; and previous pesticide exposure.

72-1702. Hegyi, E.; Hudakova, G. (Universitaets-Hautklinik der Komensky-Universitaet in Martin, Czechoslovakia). **Zur Dynamik der Morbiditaet von Berufsdermatosen. Die Noxen fuer die Ausloesung von Berufsdermatosen und ihre Bedeutung in den einzelnen Wirtschaftszweigen. [On the dynamics of the morbidity of occupational dermatoses. Noxae initiating occupational dermatoses and their significance in the individual branches of the economy.]** *Berufsdermatosen 18(3): 113-131; 1970.* (17 references) (German)

An analysis of 4000 cases of occupational dermatoses between 1958 and 1963 revealed the possible implication of 4789 noxae, of which 2300 represented various microbes. Dermatoses due to insecticides and related chemicals occurred in the machine industry (21 substances), chemical industry (22 substances), health field (24 substances), communal industry (32 substances) and food industry (3 substances). The number of dermatosis cases in general decreased during the second four-year interval, as compared to the first two-year interval, perhaps indicating that increased attention was paid to protective measures. Of the 40 insecticides and other agricultural chemicals recorded as dermatosis noxae between 1960 and 1963, 13, or 32.5%, were classified as allergens.

72-1703. Ishikawa, S.; Uono, K.; Segawa, M. (School of Ophthalmology, Faculty of Medicine, Kitazato U., Sagamihara-shi, Kanagawa Prefecture, Japan). **[Organophosphorus pesticide intoxication (chronic cases).]** *No To Shinkei (Brain Nerve) 24(4): 387-391; 1972.* (9 references) (Japanese)

Syndromes characterized primarily by impaired vision and disorders of the nerves, have occurred in Japan since about 1955 and centered in the Saku District of Nagano Prefecture and the Kitakawachi District of Osaka Prefecture. They have been attributed to subchronic or chronic organophosphate poisoning. The symptoms resemble those of parathion and tri-*o*-cresyl phosphate poisoning; since minute pesticide quantities can sometimes produce symptoms, combined exposure to several substances may be implicated. The high sensitivity of ocular tissues may be due to their higher content of true cholinesterase, and to the fact that airborne pesticides can dissolve in the tears and be carried into the cornea. The main ocular manifestations include reduced visual acuity, narrowing of the visual field, astigmatism (frequently accompanied by myopia), and optic nerve abnormalities. Blindness may result from optic nerve atrophy unless treatment is successful. Nervous system disorders include diminution of deep and superficial reflexes, sensory losses, muscular atrophy and abnormalities in EEG and EMG. Atropine treatment is effective. The urine contains *p*-nitrophenol or *p*-nitrocresol in areas of high parathion, EPN or fenitrothion use.

72-1704. Michaux, P.; Boiteau, H. L.; Tolot, F. (Rennes, France). **Valeur et limites du depistage clinique et biologique en pathologie professionnelle. [Value and limitations of clinical and biological detection in occupational pathology.]** *Arch. Mal. Prof. (Med. Trav. Secur. Soc.) 32(1-2): 1-124; 1971.* (391 references) (French)

Occupational exposure to physical and chemical agents including pesticides is reviewed. While modern techniques can detect microgram amounts of these compounds in both the environment and biological matter, the interpretation of this data still poses difficulties. Arsenic(As) is found in normal blood in levels ranging from 0.0-0.025 mg/100 ml. Symptoms of chronic poisoning are considered present only when As ranges from 3.0-5.0 in dry hair or from 5.0-10.0 mg/kg in dry nail or exceeds 1.0 mg/l in the urine. Along with mercury(Hg), As constitutes an SH-group blocking agent, and its affinity toward gluthathione and cysteine leads to the alteration of the oxidation and reduction processes involved in carbohydrate and lipid metabolism. Urine analysis is the most widely used means in the diagnosis of Hg poisoning; even at high concentrations though, urinary Hg levels are an index of Hg exposure rather than an absolute diagnostic measure of poisoning. Hg's affinity towards the SH group is manifested at the protein level by decreased serum albumin and γ-globulin and increased α-globulin levels. Some of the biochemical alterations produced by Hg are: increased serum alkaline phosphatase (attributed to hepatocellular damage) and alterations in the microscopical features of the erythrocyte due to potassium ion losses. Of the organochlorines, pentachlorophenol is rapidly excreted and has as its main target organs the lung, kidney, and liver. DDT, BHC, lindane, dieldrin, aldrin, endrin, and chlordane blood levels are correlated with those of the Central Nervous System and adipose tissues. Determination of DDA (dichlorophenylacetic acid) in the urine constitutes an essential test in the follow-up of workers exposed to DDT. Alteration of the EEG constitutes the basic test in the follow-up of neurotoxicity induced by other organochlorines. The excretion of organophosphate, several hours after exposure (in the form of paranitrophenol in

the case of parathion type compounds), has not been correlated with changes in serum cholinesterase activity. Descriptions of clinical symptoms resulting from poisoning with each of the above compounds are presented along with occupational safety regulations and medical surveillance features for workers involved in handling such compounds.

72-1705. Tjaij, J. K.; Aziz, D. (Dept. of Child Health, Medical School, U. of North Sumatra, Medan, Malaysia). **A mass acute poisoning resembling chlorinated insecticides poisoning but with unknown source.** *Paediat. Indones. 11(1): 23-26; 1971.* (2 references)

On February 19, 1967, twelve adults and two children from a village near the airfield in Medan, Sumatra, developed symptoms which necessitated hospital observation. The adults reported the development of dizziness, weakness, nausea, vomiting, and loss of consciousness. Epileptiform seizures were observed. All of the adults recovered after symptomatic treatment. Five additional adults developed similar symptoms on the following day. The two children, who were siblings, were admitted with convulsions, fever, and dyspnea. A third child had died in a state of continuous convulsions without being brought to the hospital. Upon admittance, both children were given injections of 60 mg phenobarbital and 10 mg largactil. This treatment brought the convulsions to a standstill in one child, but not in the other, who died in respiratory failure 4 hr after admittance. The pattern of symptoms in this episode resembles that resulting from organochlorine poisoning; however, the urine examinations and autopsies which would have confirmed this hypothesis were not performed. No foodstuff could be implicated as the source of the poison, and the possibility of inhalation of insecticide from cropdusters at the nearby airport seemed remote.

See also **72-1596** **72-1598** **72-1602** **72-1603** **72-1605** **72-1606** **72-1641** **72-1659** **72-1736** **72-1771** **72-1795**

72-1706. Binenfeld, Z.; Boskovic, B.; Rakin, D.; Cosic, M. (High Technical School, Ground Forces, Zagreb, Yugoslavia). **Phenacyloximes as antidotes in organophosphorus poisoning.** *Acta Pharm. Jugoslav. 21(3): 113-120; 1971.* (16 references)

Four synthetic phenacyloximes were used as antidotes for organophosphate poisoning in mice. In comparison with PAM-Cl, all four were very toxic. The least toxic and mildest inhibitor of ChE was 1-phenacyloxime-4,5-dichloroquinolinium chloride. All the compounds strongly inhibited both erythrocyte and plasma ChE. In sarin poisoning the same protective effect was achieved with PAM-2Cl or 1-phenacyloxime isoquinolinium chloride (I) at doses of 46.0 and 16.4 mg/kg, respectively; in paraoxon poisoning PAM-2 Cl was 10 times more effective when applied with atropine. Both direct action and reactivation of ChE seem responsible for the protective effect of (I).

72-1707. Williams, P. P.; Stolzenberg, R. L. (U.S. Dept. of Agriculture, Animal Science Research Div., Metabolism and Radiation Research Lab., Fargo, ND 58102). **Ruminal bacterial degradation of benzo(b)-thien-4-yl methylcarbamate (Mobam) and effect of Mobam on ruminal bacteria.** *Appl. Microbiol. 23(4): 745-749; 1972.* (14 references)

Mixed-cell suspensions of ruminal bacteria incubated with labeled Mobam (benzo(b)-thien-4-yl methylcarbamate) produced CO_2, 4-hydroxybenzothiophene and unidentified polar products. Sephadex chromatography, TLC, and IR and mass spectrometry were used to identify the metabolite from suspensions incubated with ring-labeled material. Labeled polar products were only found when bacteria were incubated with Mobam labeled in the carbonyl or methyl positions, indicating that the methylcarbamate moiety was the carbon source for these products. Of the ruminal sample bacterial isolates obtained on tributyrin emulsion-Mobam medium, three degraded Mobam at rates of 21.9, 23.3, and 18.4% in 18 hr. Growth of two of ten strains isolated on Mobam-free medium was inhibited by the insecticide, and one of the strains was also inhibited by Phosdrin (mevinphos). Some ruminal bacteria were inhibited from degrading 1-naphthyl acetate and fluorescein-3′,6′-diacetate and from producing hydrolysis zones on tributyrin emulsion media. The levels of Mobam used in the experiments were higher than those predicted in ruminal contamination.

72-1708. Villeneuve, D. C.; Grant, D. L.; Phillips, W. E. J. (Research Lab., Food and Drug Directorate, Tunney's Pasture, Ottawa, Ont., Canada). **Modification of pentobarbital sleeping times in rats following chronic PCB ingestion.** *Bull. Environ. Contam. Toxicol. 7(5): 264-269; 1972.* (9 references)

Male rats were fed diets containing Aroclor 1242, Aroclor 1254, Aroclor 1260, or α-chlordane and after 30 days had reduced sleeping times (measured as the interval between injection of pentobarbital and restoration of the righting reflex). Pentobarbital sleeping time was not affected by Aroclor 1221 at 30 days or by *p,p′*-methoxychlor at 30 or 240 days. In female rats, given lower doses of pentobarbital, only Aroclor 1254, Aroclor 1260, and α-chlordane reduced sleeping times at 30 or 350 days. In the male rats, adipose tissue contained higher chemical residues than liver, heart or brain, and levels tended to increase with the chlorine content of the compound. None of the tissues examined contained methoxychlor. Activity of the compound seemed to be directly related to the storage of the compound in fat.

72-1709. Machin, A. F.; Quick, M. P.; Rogers, H.; Janes, N. F. (Ministry of Agriculture, Fisheries & Food, Central Veterinary Lab., New Haw, Weybridge, Surrey, England). **An isomer of hydroxydiazinon formed by metabolism in sheep.** *Bull. Environ. Contam. Toxicol. 7(5): 270-272; 1972.* (5 references)

Urine and tissue collected from sheep dosed with 800 or 1000 mg/kg diazinon contained a metabolite identified as an isomer of hydroxydiazinon, diethyl 6-hydroxymethyl-2-isopropyl-4-pyrimidinyl phosphorothionate. Column chromatography and repeated TLC gave a product sufficiently pure for spectroscopic identification. NMR, mass spectrometry and IR data confirmed the structure. The metabolite yielded a red spot on TLC plates with 2,6-dichloro-*p*-benzoquinone-4-chloroimine, and after oxidation with bromine it inhibited cholinesterase. The proportion of this isomer was far greater in urine than in tissues, indicating rapid excretion.

72-1710. Simpson, C. F.; Thompson, N. P.; Neilson, J. T. (Dept. of Veterinary Science and Food Science, U. of Florida, Gainesville, FL 32601). **Effect of long-term feeding of DDT to turkeys.** *Bull. Environ. Contam. Toxicol. 7(5): 277-283; 1972.* (24 references)

Immature male and female turkeys fed 264.6 ppm *o,p′*- or *p,p′*-DDT in their diet accumulated high levels of DDT in body fat, but did not show signs of estrogenic effects. There were no significant changes in: histology of the heart, aorta, liver, testes, oviduct, ovary, thyroid, or kidney; blood pressure; gross tissue structure; plasma calcium, cholesterol, and lipoprotein levels; and albumin-globulin ratio. Trace amounts of DDT were found in tissue from control turkeys. Higher residues were observed with *p,p′*-DDT than with *o,p′*-DDT.

72-1711. Grant, D. L.; Phillips, W. E. J. (Research Labs., Food and Drug Directorate, Dept. of National Health and Welfare, Tunney's Pasture, Ottawa K1A OL2, Ont., Canada). **The effect of liver damage on the storage of *p,p′*-DDT in the rat.** *Bull. Environ. Contam. Toxicol. 7(5): 284-287; 1972.* (14 references)

The effect liver damage has on the storage of orally administered *p,p'*-DDT was investigated in the rat. Experimental concern with the liver stemmed from the observation that DDT residues are often higher in humans with abnormal livers. Experimental liver damage was induced in rats by administration of CCl_4. Following this treatment, the rats had significantly greater levels of *p,p'*-DDT, *p,p'*-DDD, and *p,p'*-DDE in sera and brains than did the controls. CCl_4 treatment following administration of DDT produced similar changes in tissue levels.

72-1712. Casterline, Jr., J. L.; Williams, C. H. (Bureau of Foods, U.S. Dept. of Health, Education and Welfare, Washington, D.C. 20204). **Elimination pattern of methyl mercury from blood and brain of rats (dams and offspring) after delivery, following oral administration of its chloride salt during gestation.** *Bull. Environ. Contam. Toxicol. 7(5): 292-295; 1972.* (5 references)

Methyl mercury chloride was administered orally to pregnant rats at 0.1, 0.5, or 2.5 mg/kg, from the 6th to 15th day of gestation. The female rats and their offspring showed no overt signs of toxicity, except for some minor growth retardation at the highest dosage level. Transfer of the compound occurred either through the placenta or the mother's milk. In red blood cells, brain and plasma, the levels of methyl mercury were the same in the offspring and the dams six days after delivery. However, the young cleared the compound more readily than the dams.

72-1713. Anderson, J. P. E.; Lichtenstein, E. P. (Dept. of Entomology, U. of Wisconsin, Madison, WI). **Effects of various soil fungi and insecticides on the capacity of *Mucor alternans* to degrade DDT.** *Can. J. Microbiol. 18(5): 553-560; 1972.* (24 references)

Pure cultures of the fungus *Mucor alternans*, isolated from DDT-contaminated soils, were able to degrade DDT to water-soluble metabolites. After the addition of fungal spores to DDT-contaminated soils, however, the insecticide-degrading capacity of the fungus was no longer evident. Since under field conditions many species of fungi are simultaneously exposed to mixed residues of pesticidal chemicals, the effects of various species of soil fungi and of various insecticides on DDT degradation by *M. alternans* were investigated. Experiments were conducted to study the effect of nine fungal species, their stale cell-free media, and various insecticides and related compounds on the capacity of *M. alternans* to degrade ^{14}C-DDT to water-soluble metabolites. It was found that several pure fungal cultures or some cell-free media, in which mycelia had grown, could also degrade the insecticide. In most cases, however, addition of one of the various fungi to ^{14}C-DDT-treated *M. alternans* cultures resulted in a total depression of the appearance of water-soluble metabolites in the media. This was due to an accumulation of the metabolites in the mycelium of the other fungus or in an inhibition of metabolite formation. Addition of stale media from various fungi to ^{14}C-DDT-treated *M. alternans* cultures had various effects on fungal growth and on the capacity of the fungus to degrade the insecticide. Among the insecticides and related compounds tested only lindane, parathion, and Dyfonate caused a reduction in DDT degradation by *M. alternans*, without severely reducing its vegetative growth. (Author abstract by permission)

72-1714. McKinney, J. D.; Fishbein, L. (National Inst. of Environmental Health Sciences, P. O. Box 12233, Research Triangle Park, NC 27709). **DDE formation: dehydrochlorination or dehypochlorination.** *Chemosphere 1(2): 67-70; 1972.* (19 references)

The possible metabolic fate of DDT, particularly the formation of DDE is discussed with references to recent literature. An alternative mechanism to dehydrochlorination of the DDT molecule is suggested; this involves formation of kelthane by initial substitution of oxygen for hydrogen at the tertiary-carbon, followed by dehypochlorination. Conjugation of kelthane must be responsible for DDT activation toward elimination rather than decomposition. The varied physiological responses, brought about by differences in DDT enzyme induction, are probably responsible for qualitative and quantitative differences in DDT metabolism.

72-1715. Kaul, R.; Weisgerber, I.; Klein, W. (Institut fuer Oekologische Chemie, 5205 St. Augustin 1, Schloss Birlinghoven, Germany). **Beitraege zur oekologischen Chemie XXXIX. Verteilung und Umwandlung von *trans*-Chlordan-^{14}C in Weisskohl und Moehren. [Contributions to ecological chemistry XXXIX. Distribution and biotransformation of *trans*-chlordane-^{14}C in cabbage and beets.]** *Chemosphere 1(2): 79-82; 1972.* (8 references) (German)

An acetone solution containing 1 mg of *trans*-chlordane-^{14}C was applied in very fine droplet form to the leaves of ten cabbage plants. Leaves, stems and roots were collected separately after 4 and 10 wk, immersed in methanol to remove radioactive compounds on the plant exteriors, and then homogenized with methanol and subjected to Soxhlet extraction. After 4 wk, only 0.85% of the radioactivity applied was detected on the leaf surfaces. Most of the radioactivity (35%) was located in the leaf interior; only 1.7% was distributed in and on the untreated plant parts and soil, these amounts decreasing in a downward direction. The remainder had been released into the atmosphere. Between the 4th and 10th wk, radioactivity in and on the leaves and stems decreased, while that in the roots and soil increased. At 4 wk, three chlordane metabolites accounted for about 40% of the radioactivity present and at 10 weeks, for about 50%. When beet seeds were planted in 21 kg of soil containing 4 mg of *trans*-chlordane-^{14}C, only a small amount of the radioactivity was taken up into the beets,

and the majority of this was in its original form. Small amounts of the three metabolites found in cabbage were also present in the beets.

72-1716. Weisgerber, I.; Klein, W.; Korte, F. (Institut fuer Oekologische Chemie, 5205 St. Augustin 1, Schloss Birlinghoven, Germany). **Beitraege zur oekologischen Chemie XLII. Verteilung und Umwandlung von Heptachlor-^{14}C in Weisskohl und Weizen. [Contributions to ecological chemistry XLII. Distribution and biotransformation of Heptachlor-^{14}C in cabbage and wheat.]** *Chemosphere 1(2): 89-94; 1972.* (16 references) (German)

Very fine droplets of an acetone solution of 1 mg heptachlor-^{14}C were applied to the leaves of five young cabbage plants. After 4 mo, only 0.4% of the applied radioactivity was still present on the leaf surfaces; 7.1% had been taken up into the plant, and 0.3% was detectable in the soil. The remainder had been released into the atmosphere. The majority of radioactivity in the plant was found in the leaves. Only 7 to 34% of the radioactivity present after 4 mo was in the form of heptachlor. The remainder consisted primarily of a group of hydrophilic metabolites, including 1-hydroxychlordene. All samples contained heptachlor epoxide, as well as a substance with a molecular weight of 366, which was slightly less hydrophilic than heptachlor epoxide. The highly hydrophilic metabolites appeared to be formed only in living plants. Forty wheat grains were each treated with 11.4 μg of heptachlor and grown in pots for 20 days or 3.5 mo; the plants took up only 2.4% of the applied radioactivity by the time of ripening, with highest levels in the straw. The majority of radioactivity was in the form of heptachlor epoxide, followed by a hydrophilic group, unchanged heptachlor, and the unknown metabolite of mol wt 366.

72-1717. Stancliffe, T. C.; Pirie, A. (Nuffield Lab. of Ophthalmology, U. of Oxford, Oxford, OX2 6AW, England). **The production of superoxide radicals in reactions of the herbicide diquat.** *FEBS (Fed. Eur. Biochem. Soc.) Lett. 17(2): 297-299; 1971.* (12 references)

Diquat free radical was formed either by reaction of diquat with glutathione reductase [EC 1.6.4.2] or photochemically in the presence of EDTA or amino acids. Both free radical generating systems catalyzed the enzymatic oxidation of adrenalin (epinephrine) to adrenochrome and the enzymatic reduction of ferricytochrome *c*. The inhibitory effect of added superoxide dismutase in these reactions indicated that superoxide radicals are formed by the aerobic autoxidation of diquat free radical indicating that superoxide radicals can be formed in tissues of diquat-fed animals.

72-1718. Eskenazi, M.; Vodenicharova, H.; Yomtov, M. (Research Inst. on Epidemiology and Microbiology, Sofia, Bulgaria). **The influence of preincubation with antibodies and mipafox on the enzyme activity of cholinesterase.** *Dokl. Bolg. Akad. Nauk (C.R. Acad. Bulg. Sci.) 24(6): 793-796; 1971.* (11 references)

ChE was preincubated with varying amounts of gamma-fraction from immune rabbit serum for 2 hr; this led to complete inhibition of the enzyme activity when the mixture was stored overnight at 4°, and 53% inhibition with no storage. Simultaneous incubation of the enzyme and antibody with substrate yielded no change in enzyme activity, probably the result of the protective effect of the substrate. Mipafox, at 10^{-2} or 10^{-6} *M*, completely inhibited ChE after a 30 min preincubation. Data obtained from immunodiffusion analysis of ChE and mipafox-inhibited ChE supported the theory that the small molecule attacks the active site of the enzyme, while antibodies react with antigenic determinants located outside the active site.

72-1719. Fabacher, D. L.; Chambers, H. (Dept. of Entomology, Mississippi State U., State College, MS). **Rotenone tolerance in mosquitofish.** *Environ. Pollut. 3(2): 139-141; 1972.* (4 references)

Comparison of mosquitofish from two different areas in Mississippi indicated that one strain was 1.8 times as tolerant of rotenone as the other. The toxicity was essentially the same for resistant and susceptible fish pretreated with sesamex, an inhibitor of mixed-function oxidase (mfo) enzymes. Since the resistant mosquitofish were not known to have been exposed to rotenone, a cross-tolerance to rotenone resulting from induction of high levels of mfo enzymes by organochlorines was suggested.

72-1720. Landauer, W.; Salam, N.; Sopher, D. (Dept. of Animal Genetics, University College London, London NW 1, England). **The herbicide 3-amino-1,2,4-triazole (amitrole) as teratogen.** *Environ. Res. 4: 539-543; 1971.* (17 references)

In a study of chicken embryo development, amitrole was most toxic when injected into the yolk sac at 0 or 96 hr, and showed clear dose dependence. At 96 hr and at a 40 mg dosage there was a 60.5% chick mortality rate; beak abnormalities occurred in 60.6% of the cases and bent tibia in 17.0%. The direction of lateral deviation of the beaks was generally to the left. This abnormality was seen even after as small a dosage as 10 mg/kg. Administration of the following substances did not protect against the teratogenic effects of amitrole: riboflavin-5-phosphoric acid monosodium dihydrate, adenine hydrochloride, histidine, glycine, sodium succinate, DL-*a*-glycerophosphate hexahydrate disodium salt, reduced glutathione, sodium folate, nicotinamide and ADP. The teratogenicity of the herbicide was reduced, however, when it was dissolved in dimethyl sulfoxide rather than water.

72-1721. Linyuchev, M. N.; Satrapinsky, Yu. F.; Khramov, E. A. (I. M. Sechenov Inst. of Evolutionary Physiology and Biochemistry, USSR Academy of Science, Leningrad, USSR). **Vliyaniye TMB-4 i izonitrozina na ingibirovannuyu arminom kholinesterazu mozga i krovi. [Effects of TMB-4 and isonitrosine on armine-inhibited blood and brain cholinesterase.]** *Farmakol. Toksikol. (Moscow) 35(1): 25-28; 1972.* (11 references) (Russian)

Mice were poisoned by subcutaneous injection of armine at 300 γ/kg, and then given intravenous or intraperitoneal injections of TMB-4 (a quaternary reactivator) at 0.2, 0.5, 1, 2, 5 or 10 mg/kg. This resulted in the rapid restoration of blood cholinesterase activity but not brain cholinesterase activity. Injection of TMB-4 into the lateral brain ventricle restored cholinesterase activity in brain and blood. A similar result was obtained when TMB-4 was injected at 2 mg/kg intravenously and into the lateral brain ventricle of rabbits poisoned with armine at 50 mg/kg. Isonitrosine (a tertiary reactivator) given at 20 or 40 mg/kg produced some restoration of cholinesterase activity in armine-poisoned mice, but the degree of enzyme reactivation in brain and blood varied little with the different administration routes. (From author abstract)

72-1722. Mestechkina, A. Ya. (Research Inst. for Endocrinology and Metabolism, Kiev, USSR). **Sul'fgidril'nyye gruppy belkov i nebelkovykh soedineniy v nekotorykh otdelakh golovnogo mozga sobak pri vvedenii *o,p'*-DDD. [Protein and nonprotein sulfhydryl groups in some sections of the dog brain after administration of *o,p'*-DDD.]** *Farmakol. Toksikol. (Moscow) 35(1): 110-111; 1972.* (9 references) (Russian)

Peroral doses of 10, 25, or 50 mg/kg body weight of *o,p'*-DDD (TDE) were given to dogs for 25, 20 or 6 to 22 days respectively. No changes were produced in the sulfhydryl-group content of the brain sections examined, in the active SH-group content of the brain homogenate supernate, or in the thiol-group content of the deproteinated brain extract. In *in vitro* studies, the brain homogenates were treated with TDE at 50 μg/g protein, and the supernatant solutions with 100 μg/g protein, then incubated for 15 min at 30°C. Under these conditions as well, no changes were observed in SH group content of the protein component or in thiol groups of the nonprotein component, when compared to controls.

72-1723. Bobik, A.; Holder, G. M.; Ryan, A. J. (Dept. of Pharmacy, U. of Sydney, Sydney, New South Wales 2006, Australia). **Excretory and metabolic studies of isopropyl *N*-(3-chlorophenyl)carbamate in the rat.** *Food Cosmet. Toxicol. 10(3): 163-170; 1972.* (11 references)

The excretion and metabolic fate of [^{14}C]isopropyl *N*-(3-chlorophenyl)carbamate (alkyl[^{14}C]-CIPC) and isopropyl *N*-(3-chloro[^{14}C]phenyl)carbamate (ring[^{14}C]-CIPC) was investigated in the rat after both intraperitoneal and oral dosage. The 4 day urinary excretion after administration of alkyl- and ring-labelled compounds was about 50 and 85% of the administered radioactivity, respectively, and with the alkyl-labelled compound 17 to 20% of the administered radioactivity appeared in the respired air. Studies with neomycin-treated rats indicated that hydrolysis of the carbamate link occurred systemically in the animal rather than in its intestine, and *in vitro* studies suggested that the site of hydrolysis might be the liver. The 6 hr biliary excretion of radioactivity accounted for 40% of an intravenous dose. (Author abstract by permission)

72-1724. El-Refai, A.; Hopkins, T. L. (Faculty of Agriculture, Al-Azhar U., Cairo, Egypt). **Malathion absorption, translocation, and conversion to malaoxon in bean plants.** *J. Ass. Offic. Anal. Chem. 55(3): 526-531; 1972.* (19 references)

Malathion deposits on bean plant leaves, *Phaseolus vulgaris*, decreased 50% in 2 days under controlled environmental conditions. The decrease was initially more rapid from leaves than from glass surfaces, due to combined evaporation and absorption, but later the cuticular residues became more persistent. Five percent of the malathion deposit was absorbed within a few minutes after application to bean leaves and declined to 0.4% by 10 days. Malathion degradation products accumulating on both glass and leaf surfaces were similar and included small amounts of malaoxon and an unknown cholinesterase inhibitor. Malathion is not translocated to any great extent in bean plants, but penetrates from the surface into the interior of the leaf and also from a nutrient solution into the root. Small malaoxon residues also accumulated in roots and foliage. (Author abstract by permission)

72-1725. van Halteren, P. (S. M. L. Rice Project, Wageningen, Surinam, South America). **Preliminary investigations on dieldrin accumulation in an insect food chain.** *J. Econ. Entomol. 64(5): 1055-1056; 1972.* (5 references)

Nymphs of the praying mantid *Tenodera superstitiosa* F. were fed on *Drosophila* flies reared in a dieldrin-contaminated medium. Subsequently they were starved and forced to eat one another. There was no evidence of dieldrin accumulation in the mantid food chain. (Author abstract by permission)

72-1726. Kawatski, J. A.; Schmulbach, J. C. (Dept. of Biology, U. of South Dakota, Vermillion, SD 57069). **Toxicities of aldrin and dieldrin to the freshwater ostracod *Chlamydotheca arcuata*.** *J. Econ. Entomol. 64(5): 1082-1085; 1972.* (15 references)

Acute toxicities of various mixtures of aldrin and dieldrin against laboratory-reared, insecticide-free ostracods, *Chlamydotheca arcuata* (Sars), were determined. The 24 hr immobility EC_{50} values were 1.15 and 2.45

ppb for aldrin and dieldrin, respectively. Bioassay results from using combinations of aldrin and dieldrin demonstrated no synergism or potentiation with respect to the two insecticides. Ostracods which were laboratory-reared in the presence of insecticide were also tested to determine if increased resistance or sensitivity to the chemicals had occurred by virtue of chronic exposure. Sublethal exposure to either insecticide through several generations produced populations which were more susceptible to both insecticides. In all instances, aldrin was about twice as toxic as dieldrin. (Author abstract by permission)

72-1727. Sherman, M.; Herrick, R. B. (College of Tropical Agriculture, U. of Hawaii, Honolulu, HI 96822). **Fly control, chronic toxicity, and residues from feeding Rabon to laying hens.** *J. Econ. Entomol. 64(5): 1159-1164; 1972.* (15 references)

Effects of administering technical Rabon (2-chloro-1-(2,4,5-trichlorophenyl) vinyl dimethyl phosphate, Gardona) at a concentration of 400 and 800 ppm in the feed of laying hens were investigated. No hen mortality occurred that could be attributed to the insecticidal treatments, nor was there any inhibiting effect detected on blood plasma cholinesterase activity. Hens which received 800 ppm Rabon in their diet consumed less feed, produced fewer eggs, and did not maintain their body weight as well as the control birds. At 400 ppm Rabon had less detrimental effect, and although birds at this concentration consumed less feed and produced fewer eggs than the control birds, they were able to maintain their body weight. Egg weight, interior egg quality, shell thickness, and odor were normal, but eggs from treated hens had a less desirable flavor than eggs laid by untreated hens. Feed efficiency was significantly less among both groups of hens receiving Rabon in the diet than among untreated control hens. No detectable residues of Rabon (*cis*) or its low-melting isomer SD-13462 (*trans*) were found in the eggs or in any of the tissue samples except for two 800 ppm 14-day-posttreatment breast-muscle samples; two 800 ppm 0-day-posttreatment liver samples; three 800 ppm 0 day-posttreatment peritoneal-fat samples; and two 400 ppm 0-day-posttreatment fat samples. All but one (0.07 ppm) of the residues detected were in the 0.02 to 0.03 ppm range. (Author abstract by permission, abridged)

72-1728. Brust, R. A.; Miyazaki, S.; Hodgson, G. C. (U. of Manitoba, Winnipeg, Manitoba, Canada). **Effect of Dursban in the drinking water of chicks.** *J. Econ. Entomol. 64(5): 1179-1183; 1971.* (9 references)

Dursban (*O,O*-diethyl *O*-(3,5,6-trichloro-2-pyridyl) phosphorothioate) was added to the drinking water of young Leghorn cockerels at eight levels ranging from 0.08 to 1280 ppm active ingredient. Experiments were begun with chicks 3 or 5 days old and were concluded after 3 and 4 wk. Mortality at 80 ppm was 20%, and mortality at 320 and 1280 ppm was 100%. No adverse effects were apparent at lower levels. Solvent and inert ingredients of Dursban emulsifiable concentrate had no adverse effect on the chicks up to 717.7 ppm. Cholinesterase activity in whole blood was monitored at all treatment levels, and the activity decreased at 80 ppm Dursban and above. At lower levels there was no significant difference from the controls. Weight gain per day diminished with increased levels of Dursban. Starvation of treated chicks did not affect blood-cholinesterase activity. (Author abstract by permission)

72-1729. Renier, E.; Renier-Cornec, A.; Boissier, J. R.; Hazard, R. (Laboratoire de Pharmacologie II, U.E.R. Biomedicale des Cordeliers, Paris, France). **Modifications des effets excito-ganglionnaires de l'acetylcholine sous l'influence des ganglioplegiques et des anticholinesterasiques. [Modifications of the ganglionic stimulating effects of acetylcholine by ganglionic blocking agents and anticholinesterase compounds.]** *J. Pharmacol. 2(4): 445-456; 1971.* (23 references) (French)

The blocking of muscarinic receptors by atropine or poldine nullified the stimulating effects of acetylcholine on superior cervical ganglia in cats and its nicotinic blood pressure effects in dogs. Subsequent administration of anticholinesterase agents (including DFP) restored acetylcholine's ability to stimulate sympathetic ganglia in cats and dogs. The lack of nicotinic actions under these conditions was probably due to blockage of nicotinic receptors; the pattern of acetylcholine effects might be explained by the action of acetylcholine on ganglionic muscarinic receptors. Various nicotinic receptor types differ in their responses to drugs: the receptors in the superior cervical ganglia of the cat are less sensitive to blocking agents than those in the adrenal medulla and sympathetic ganglia of the dog, and at low blocking-agent doses, the induced block can even be reversed by anticholinesterase agents. The mechanism of reciprocal antagonism between anticholinesterase agents and ganglionic blocking compounds still needs to be explained.

72-1730. Ogata, S. (Tokyo U. of Odontology and Medicine, Kanda-Misaki-cho, Chiyoda-ku, Tokyo, Japan). **[Chronic toxicity studies of organophosphates in beagle dogs.]** *Nippon Ganka Gakkai Zasshi (J. Jap. Ophthalmol. Soc.)76(Suppl.): 55; 1972.* (Japanese)

The ocular effects of chronic organophosphate poisoning were investigated in beagle dogs given daily oral doses of 2 mg/kg body weight of fenitrothion or fenthion for one year. Periodic examinations and laboratory studies were performed, followed by histological and histochemical examinations of tissue specimens at the end of the experimental period. Distinct reductions in erythrocyte and plasma cholinesterase activities were recorded. No abnormalities in liver, kidney or intestinal

function were observed. Eye examinations, including tests of refraction, corneal curvature, ocular tension and condition of eyegrounds revealed essentially no changes during the one-yr period of research. No macroscopic eye abnormalities were observable. Results of histological eye examinations will be reported elsewhere.

72-1731. Kataoka, S.; Araki, S.; Yoshizaki, H. Kawasaki, T.; Kanda, M. (School of Legal Medicine, Kumamoto U., Kumamoto-shi, Japan). **[Effect of organophosphorus pesticides on respiration in brain of rats.]** *Nippon Hoigaku Zasshi (Jap. J. Leg. Med). 26(2): 124-125; 1972.* (Japanese)

The effects of the organophosphate pesticides, parathion and malathion, on respiration in slices of rat cerebral cortex were studied. The cortex slices were incubated with the pesticide and a buffer solution in a Warburg flask for 60 min at 37°C; the consumption of oxygen and sugar and the formation of lactic acid under aerobic conditions were investigated. The oxygen consumption began to decrease only when the organophosphate concentration reached a relatively high value; lactic acid formation and sugar consumption paralleled oxygen consumption.

72-1732. Takahama, K.; Toshimitsu, T.; Kita, G.; Abe, Y.; Kanda, M. (School of Legal Medicine, Kumamoto U., Kumamoto-shi, Japan). **[Toxicological studies on organochlorine pesticides: effects of long-term administration on body and organ weights of rabbits.]** *Nippon Hoigaku Zasshi (Jap. J. Leg. Med.) 26(2): 125; 1972.* (Japanese)

Endrin, DDT, and lindane were administered perorally for 6 mo to rabbits, and changes in body and organ weights recorded. One dose unit of pesticide (0.1 mg endrin, 50 mg DDT or 6.25 mg lindane per kg body weight) was given twice a week. The rate of weight gain for test animals was greater than that for controls, especially after the 8th wk of administration. After 6 mo, this tendency was most marked in the endrin-treated group. The greatest organ weight increases were in liver and kidney; increases in liver weight occurred in all pesticide groups, while kidney weight increases were appreciable only in groups receiving endrin and DDT. These findings were related to ideas in the literature suggesting that organochlorine pesticides act on endocrine systems, that increases in organ weight represent a physiological adaptive response; and that part of the weight gain may be related to increases in cellular microsomal enzymes.

72-1733. Camargo, L. A. A.; Saad, W. A.; Larini, L. (Cadeira de Bromatologia e Toxicologia da Faculdade de Farmacia e Odontologia de Araraquara, Araraquara, Brazil). **Toxicidade aguda do composto *O,O*-dimetil-*O*-(3-metil-4-nitrofenil)fosforotioato. Determinacao da LD50 oral, em ratos. [Acute toxicity of *O,O*-dimethyl-*O*-(3-methyl-4-nitrophenyl)phosphorothioate. Determination of the oral LD50 in the rat.]** *Rev. Fac. Farm. Odontol. Araraquara 4(1): 53-60; 1970.* (8 references) (Portuguese)

The oral LD50 of fenitrothion (Sumithion; *O,O*-dimethyl-*O*-(3-methyl-4-nitrophenyl)phosphorothioate) in the rat was determined by administering 200, 400, 600, 800, 1000, or 1200 mg/kg of fenitrothion to 6 rats at each dosage. The LD50, determined by statistical analysis of the results obtained, was 571.3 mg/kg, with a 95% confidence interval of 405.6 mg/kg to 745.5 mg/kg. Thus, fenitrothion is one of the less toxic organophosphate compounds; it is only one-half to one-third as toxic as an equal weight of dimethoate, one-fifth as toxic as diazinon, and less than one-tenth as toxic as parathion.

72-1734. Larini, L.; Camargo, L. A. A.; Saad, W. A.; Bareicha, I. (Cadeira de Bromatologia e Toxicologia da Faculdade de Farmacia e Odontologia de Araraquara, Araraquara, Brazil). **Determinacao da LD50 dermal do composto *O,O*-dimetil-*O*-(3-metil-4-nitrofenil) fosforotioato, em ratos. Consideracoes sobre as alteracoes organicas provocadas. [Determination of the dermal LD50 of *O,O*-dimethyl-*O*-(3-methyl-4-nitrophenyl)phosphorothioate in the rat. Examination of the organ changes produced.]** *Rev. Fac. Farm. Odontol. Araraquara 4(1): 61-71; 1970.* (26 references) (Portuguese)

The acute dermal LD50 of fenitrothion (Sumithion; *O,O*-dimethyl-*O*-(3-methyl-4-nitrophenyl) phosphorothioate) in female Wistar rats was determined by applying 500 and 1700 mg/kg of fenitrothion to the shaven dorsocaudal region. After application of fenitrothion to the clean but unbroken skin and coverage of the area with nylon gauze, the animals were observed for alterations in appearance or behavior. The first signs of intoxication were restlessness and increased aggressiveness. Tremors occurred in severely poisoned animals; the rats which survived returned to normal by the 7th day after treatment. The LD50 was 1001.5 mg/kg, with a 95% confidence interval of 787.1 to 1214.0 mg/kg.

72-1735. Casida, J. E.; Kimmel, E. C.; Elliott, M.; Janes, N. F. (Div of Entomology, U. of California, Berkely, CA 94720). **Oxidative metabolism of pyrethrins in mammals.** *Pyrethrum Post 11(2): 58-59,71; 1971.* (16 references)

Several metabolites isolated from urine and feces of rats were identified, following administration of labelled pyrethrin I and pyrethrin II. The ratio of the metabolites was about the same with a dose range from 0.1 to 400 mg/kg. The primary metabolite contained a COOH, which was present in all metabolites, and *cis*-4,5-dihydroxypent-2-en-l-yl. A similar metabolite had as its alcohol side chain *trans*-2,5-dihydroxypent-3-en-l-yl.

A third metabolite was a conjugate of the primary metabolite. A metabolite having no alcohol side chain was also identified. Several more polar metabolites remained to be identified.

72-1736. Brown, N. C. (Cooper Technical Bureau, Berkhamsted, Herts, U.K.). **A review of the toxicology of piperonyl butoxide.** *Pyrethrum Post 11(2): 66-68; 1971.* (11 references)

The low toxicity of piperonyl butoxide and calculations of maximum possible uptake by man (from food and air) indicates that even present maximum exposure is safe. Though the compound has a low oral toxicity, it has been shown to inhibit the metabolism of other drugs. Experiments have shown that piperonyl butoxide does not alter metabolism of antipyrine when administered to humans at 0.71 mg/kg.

72-1737. Pelikan, Z. (Duindoornstraat 19, Groningen, The Netherlands). **Short-term intoxication of rats by heptachlor administered in diet.** *Arch. Belg. Med. Soc. Hyg. Med. Tr. Med. Leg. 29(7): 462-470; 1971.* (15 references)

Two groups of rats fed heptachlor at a daily dose of 5.0 mg/kg for 14 and 28 days were observed for clinical and morphological changes. Differences in body weight between control and experimental groups and between males and females were not found. Physiological findings were normal, but mild restlessness occurred in some animals from the 28-day experiment. Gross autopsy revealed slightly enlarged livers in both groups, accompanied in the second group by changes in color and consistency. Spleens and kidneys were slightly hyperemic. Small petechiae were found in several animals and some changes were observed in the gastrointestinal mucosa. Histological findings included dispersed traces of lipids in the hepatocytes of some animals, and increased leucocytes in some germinal centers of the splenic follicles in two males from the 28-day experiment.

72-1738. Bridges, J. W.; Burke, M. D. (Dept. of Biochemistry, U. of Surrey, Guildford, England). **Factors affecting the *in vitro* interaction of biphenyl with P-450 in the hamster.** *Chem.-Biol. Interactions 3(4): 314-315; 1971.* (2 references)

The liver microsomal metabolism of biphenyl was investigated in the hamster. The relative rates of 4- and 2-hydroxylation, at their respective pH optima, were 25:1 in controls, 70:1 in animals pretreated with phenobarbitone, and 2.5:1 in animals pretreated with 3-methylcholanthrene. Preliminary work indicated that various solubilizing agents interacted with microsomal cytochrome P-450. Biphenyl also interacted with the liver microsomes in the presence of ethanol and 2- and 4-hydroxybiphenyls.

72-1739. Bunyan, P. J.; Townsend, M. G.; Taylor, A. (Pest Infestation Control Lab., Ministry of Agriculture, Fisheries and Food, Tolworth, Surbiton, Surrey, Great Britain). **Pesticide-induced changes in hepatic microsomal enzyme systems. Some effects of 1,1-di(*p*-chlorophenyl)-2,2,2-trichloroethane (DDT) and 1,1-di(*p*-chlorophenyl)-2,2-dichloroethylene (DDE) in the rat and Japanese quail.** *Chem.-Biol. Interactions 5(1): 13-26; 1972.* (41 references)

Rats were fed 50-150 ppm DDE or 150 ppm DDT in the diet, and Japanese quails were fed 10-100 ppm DDE or 100 ppm DDT for 3 wk. Then, the hepatic microsomal protein, cytochrome P-450, aniline hydroxylase, aromatic nitroreductase, phenyl benzoate esterase and total vitamin C levels, as well as tissue pesticide residues were measured. The changes observed in the enzyme factors were more closely correlated with measured tissue residues than with dietary pesticide levels. DDE appeared to be a more potent inducer of microsomal protein, cytochrome P-450 and aniline hydroxylase in rats and quail than DDT fed at the same level. The effects of DDT are most adequately expressed in terms of the resulting DDT residues. Aromatic nitroreductase was not induced by the feeding of these pesticides, and phenyl benzoate esterase levels displayed biphasic alterations. DDT was more effective than DDE in raising vitamin C levels in both species. Tissue DDE residue levels were considerably higher in quails than in rats fed similar quantities, and induction of all factors observed was more rapid and extensive in the rat.

72-1740. Tanji, J.; Kato, M. (Dept. of Physiology, Hokkaido U. School of Medicine, Sapporo, Japan). **The effect of picrotoxin and strychnine upon inhibition of fusimotor neuron discharges caused by cutaneous fiber stimulation.** *Experientia 28(1): 41-42; 1972.* (6 references)

The effects of strychnine nitrate (0.02 mg/ml) and picrotoxin (0.2 mg/ml) on spontaneously firing fusimotor neurons, with and without peripheral nerve stimulation, were studied in cats. With picrotoxin the firing intervals became irregular and the number of firings increased as the dose increased. The cessation period of firing normally observed after stimulation of the sural nerve was reduced by 45%. Spontaneous firing was increased with strychnine but no shortening of the cessation period was observed.

72-1741. Schmidt, R.; Dedek, W. (Biologisches Institut des Bereiches Medizin der Martin-Luther-Universitaet Halle-Wittenberg, DDR-402 Halle (Saale)). **Transport, Verteilung und Metabolismus von ^{3}H- and ^{14}C-markiertem DDT in graviden Maeusen unter Hungerbelastung. [Transport, distribution and metabolism of ^{3}H- and ^{14}C- labeled DDT in pregnant mice under hunger stress.]** *Experientia 28(1): 56-57; 1972.* (10 references) (German)

Three groups of mice in various stages of pregnancy received i.p. 1.0, 0.5, and 0.1 mg *p,p'*-DDT labeled with ^{3}H or ^{14}C. The same level of radioactivity was found in maternal and fetal blood, 1-1.5 and 0.5-0.8 ppm at 24 and 72 hr respectively. Concentrations in the maternal liver (3-4 ppm) were higher than those in the fetal liver (0.6-1.0 ppm). The majority of the labeled material was stored in the fat (maximum 90 ppm). In the first 10 days after birth, the residues were reduced by more than 90%. Starvation of the dams for 2 days caused a significant increase in liver residues. Residue levels of DDT and its metabolites DDE, DDD (TDE), DCB and (DDOH + DDA) were found in fetal and maternal blood, brain, liver, and fat. The quantity of TDE formed in fetal liver was very small. The DDE concentration in the liver and fat increased slightly during starvation, whereas the ratio of the other metabolites remained essentially constant.

72-1742. Franklin, M. P. (Dept. of Biochemistry, U. of Texas-Southwestern Medical Sch., Dallas, TX 75235). **Cytochrome P-450 and methylenedioxphenyl metabolism.** *Fed. Proc., Fed. Amer. Soc. Exp. Biol. 31(2): 548Abs (Abstract No. 1887); 1972.*

Several methylenedioxyphenyl compounds exhibit a Type I substrate binding spectrum with hepatic microsomes and are metabolized in the presence of oxygen and TPNH, but not DPNH, to a compound which forms a complex with reduced cytochrome P-450. This metabolite-cytochrome P-450 complex exhibits an isocyanide-like difference spectrum with pH dependent Soret maxima at 430 and 455 nm. The rate of formation of the metabolite is increased by the synergistic action of DPNH, unaffected by CN and inhibited by anaerobic conditions, mersalyl and several mixed function oxidase substrates. The apparent Km for piperonyl butoxide metabolism is around 75 μM. The inhibition of ethylmorphine demethylation by piperonyl butoxide is proportional to the amount of cytochrome P-450 present as the cytochrome P-450-piperonyl butoxide metabolite complex. The inhibition of *N*-demethylation by piperonyl butoxide thus shows mixed kinetics: a combination of competitive inhibition during the formation of the piperonyl butoxide metabolite, and noncompetitive inhibition once it is formed. It is suggested that the insecticide synergistic action of piperonyl butoxide is in part related to the stability of the metabolite-cytochrome P-450 complex. (Author abstract by permission)

72-1743. Overcash, R. G.; Lindsey, J. R.; Cassell, G. H.; Baker, H. J. (Sch. of Medicine, U. of Alabama, Birmingham, AL 35233). **Enhancement of chronic murine pneumonia in the rat by oral hexamethylphosphoramide.** *Fed. Proc., Fed. Amer. Soc. Exp. Biol. 31(2):636 Abs (Abst. No. 2381); 1972.*

In controlled studies using conventional rats, other workers have reported pneumonia as a toxic effect of the insect chemosterilant hexamethylphosphoramide (HMPA) given in the diet. Studies were performed in our laboratory to determine whether the pneumonia was a direct effect of the drug or drug enhancement of natural chronic murine pneumonia (CMP). Weanling rats of Sprague-Dawley (SD) and Long-Evans (LE) strains from conventional stocks known to have CMP were given HMPA in the diet (120 mg/kg body wt/day) for 62 days. Of 53 SD and LE rats receiving HMPA, 37% died from pneumonia and 70% of survivors had pneumonia at necropsy. No deaths and 25% pneumonias occurred in 52 untreated controls. *Mycoplasma pulmonis* was consistently recovered from treated and control groups. These results also were confirmed in isolator-reared, disease-free (DF) rats of the Fischer strain. No deaths or pneumonias resulted from feeding HMPA to 28 DF rats, but HMPA feeding plus experimental *M. pulmonis* infection of 25 DF rats caused 64% deaths and pneumonias in 92% of the survivors. No deaths and 27% pneumonias occurred in 40 DF rats given *M. pulmonis* only. HMPA is considered a tool of outstanding potential for studying pathogenesis of CMP or *M. pulmonis* infection in rats. (Author abstract by permission)

72-1744. Zimmerman, A.; Matschiner, J. T. (U. of Nebraska Coll. of Medicine, Omaha, NB 68105). **The biochemical basis of hereditary resistance to Warfarin in the rat.** *Fed. Proc., Fed. Amer. Soc. Exp. Biol. 31(2): 714Abs (Abstract No 2811); 1972.*

Current public interest ("The Super Rats are Coming", *Time*, Nov. 29, 1971) prompts us to report data obtained on a possible biochemical basis for warfarin resistance in the rat. A mechanism of action of warfarin recently proposed is based on the finding that phylloquinone-2,3-epoxide accumulates in the livers of warfarinized rats and that the epoxide inhibits vitamin K response *in vivo*. *In vitro* studies of these reactions reveal that the reduction of the epoxide to the vitamin is inhibited by warfarin. In warfarin-resistant rats the inhibition is less. Reduction of the epoxide was measured at 0.125 to 3.5 μM warfarin, a range which includes warfarin levels in rat liver reported for *in vivo* studies by Thierry *et al* (*Am. J. Physiol. 219* 854, 1970). At 1.5 μM warfarin, inhibition of reductase activity of warfarin-resistant rats was less than 35% compared with about 95% for control liver. Experiments are under way to determine the concentration of warfarin in liver of both sensitive and resistant rats following a response-producing dose of the anticoagulant. Preliminary studies indicate that less epoxide accumulates in warfarin-resistant rats receiving warfarin, which suggests that the reductase is less inhibited by warfarin *in vivo* as well as *in vitro*. Further studies will be required to confirm that the reduction of the epoxide of vitamin K requires a protein which is genetically altered and underlies hereditary resistance to warfarin in the rat. (Author abstract by permission)

72-1745. Neubert, D.; Dillmann, I. (Pharmakologisches Institut der Freien Universitaet Berlin, Berlin, Germany). **Embryotoxic effects in mice treated with 2,4,5-trichlorophenoxyacetic acid and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin.** *Naunyn-Schmiedebergs Arch. Pharmakol. 272(3): 243-264; 1972.* (20 references)

The purest sample of 2,4,5-T available is capable of producing embryotoxic effects in NMRI mice when given orally on day 6-15 of gestation. A cleft palate frequency exceeding that of controls is observed with doses higher than 20 mg/kg–about $^{1}/_{6}$ LD50. Reductions in fetal weight may be observed with doses as low as 10-15 mg/kg. No clear-cut increase in embryolethality over that of controls is seen with these doses. Preliminary studies with 2,4,5-T-butyl ester showed this drug to have embryotoxic effects on mice comparable to those seen after administration of 2,4,5-T when given during day 6-15 of gestation. Using high doses (150-300 mg/kg) cleft palates can be produced with a single oral dose of high-purity 2,4,5-T (A). A maximal teratogenic effect is seen when the drug is administered on day 12 or 13 of gestation. Oral administration of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDBD) at doses exceeding 1 μ/kg (day 6-15 of gestation) also produces cleft palate in the fetuses of the same strain of mice. Embryomortality is drastically increased as compared with controls when doses of 4.5 μg/kg or more are given. Cleft palate without a pronounced embryolethal effect can be produced in NMRI mice with high (20-50 μg/kg) single doses of TCDBD given between day 7 and 13 of pregnancy. A maximal teratogenic effect is obtained on day 11 of gestation but another peak in cleft palate frequency seems to occur when the drug is given on day 8 of pregnancy. (Author abstract by permission)

72-1746. Henderson, P. T. (Laboratorium voor Farmacologie, Katholieke U. te Nijmegen, Netherlands). **Inductie van microsomale enzymen in de lever en de betekenis ervan bij de behandeling van icterus. [Induction of hepatic microsomal enzymes and its significance in the treatment of jaundice.]** *Ned. Tijdschr. Geneesk. 115: 1652-1660; 1971.* (36 references) (Dutch)

The role of hepatic microsomal enzymes in the metabolism of drugs and endogenous substances is reviewed, and the therapeutic implications of the existing interactions discussed. These enzymes play a vital role in the excretion of both exogenous chemicals and physiological waste products, and are capable of undergoing substrate induction by a variety of substances, including phenobarbital and DDT. Abnormally low enzyme levels or excessive bilirubin production, leading to jaundice in some disease states, might be combatted by administration of microsomal enzyme inducers. DDT has certain advantages over phenobarbital in this therapeutic context. It acts rapidly but offers prolonged effectiveness due to accumulation in the adipose tissue, and in contrast to phenobarbital, DDT does not produce somnolence in the patient. In order for this therapeutic possibility to be utilized, optimal therapeutic regimes would have to be developed.

72-1747. Ueda, K.; Kaai, M. (Tokyo Dental U., Chiyoda-ku, Tokyo, Japan). **[Antidotal effectiveness of glutathione in acute poisoning of mice and rabbits with methyl bromide.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 19(4): 371-372; 1971.* (Japanese)

BAL has generally been used as the antidote for methyl bromide (MeBr) poisoning, based on the assumption that MeBr combines with SH groups in the body. Since it was observed that alkyl halides such as methyl iodide are excreted in the bile as *S*-methyl-glutathione, the antidotal effectiveness of glutathione was compared to that of BAL. The acute inhalational toxicity of MeBr (LC50, 30 min) was found to be 2500 and 3850 ppm respectively in male mice and male rabbits. Mice were pretreated with varying amounts of glutathione and BAL, then exposed for 1 hr to 1850 ppm of MeBr. Survival rates were as follows: glutathione, 0 mg/kg 0/10; 250 mg/kg 4/10; 500 mg/kg 8/10; 750 mg/kg 10/10. For BAL, the survival rates were: 50 mg/kg 4/10; 100 mg/kg 6/10. Results in rabbits were analogous. *In vitro* tests revealed that the direct binding of MeBr by glutathione was not as effective as that of BAL.

72-1748. Eue, L.; Tietz, H. (Pflanzenschutz Anwendungstechnische Abteilung, Biologische Forschung, Farbenfabriken Bayer AG, Leverkusen, Germany). **4-Amino-6-tert.-butyl-3-(methylthio)-1,2,4-triazin-5-on[e] (BAY 6159 H, BAY 94337), a new herbicide for the control of weeds in potato crops.** *Pflanzenschutz-Nachrichten 23(3): 208-218; 1970.* (6 references)

Herbicides used in potato cultivation should retain their effectiveness sufficiently long so that fields will continue to be free of weeds up to harvest time. At the same time, they must not deleteriously affect subsequent crops or leave excessive residues in the potatoes. BAY 94337 (suggested common name: metribuzin) is a new substituted triazinone herbicide that appears to fulfill these requirements. Its single-dose oral LD50 values are as follows: rat, 2300 mg/kg; mouse, 700 mg/kg; guinea pig, 250 mg/kg; rabbit, 500 mg/kg; cat, 500 mg/kg; hen $>$ 1000 mg/kg. The LC50 by inhalation (sprayed continuously; reported concentration analyzed in air) is $>$ 870 mg/m^3 in the rat and $>$ 890 mg/m^3 in the mouse for 4 hr exposure, and $>$ 860 mg/m^3 in male mice for 5 X 4 hr exposure. Primary and secondary skin-damaging effects were not observed.

72-1749. Bodtker, D. J.; Kingsbury, P. J. (Biology Dept., Drake U., Des Moines, IA). **The effects of DDT and Sevin on litter decomposition and litter fauna.** *Proc. Iowa Acad. Sci. 77: 219-222; 1970.* (6 references)

Using bags containing dried oat cuttings, litter decomposition and litter fauna were studied after appli-

cation of Sevin (carbaryl), DDT or water. Rate of decomposition, measured by dry weight of the contents of the bag, was unaffected by the insecticides during the 13-wk study. DDT treated plots showed a significant decrease in all fauna except for mites and Collembola after 13 wk. As this decrease included many predators of Collembola and mites, it resulted in reduced "predator pressure" for these organisms and consequently an increase in their number. Further study is suggested as this increase should lead to a faster rate of litter decomposition due to the important role of mites and Collembola in the breakdown of dead material.

72-1750. Ikeda, S. (Government Forest Experiment Station, Ministry of Agriculture and Forestry, Tokyo, Japan). **[The toxic effect of zinc phosphide on penned quail, *Coturnix coturnix japonica.*]** *Ringyo Shikenjo Kenkyu Hokoku (Bull. Gov. Forest. Exp. Sta.) 238: 141-146; 1971.* (16 references) (Japanese)

Seven groups of penned Japanese quail, each group consisting of three males and five females, were given between 10 and 70 mg/kg of zinc phosphide. The results indicated that the LD50 of zinc phosphide for Japanese quail, male or female, was 35 mg/kg. One group of male and female quails was given 1/10 LD50 of zinc phosphide for 10 days, then reared normally for 25 days and finally given a second course of zinc phosphide for 10 days; the egg-laying rate and fertilization rate of the eggs was markedly reduced. Controls were force-fed empty capsules to determine the effect of this mode of feeding; egg-laying was reduced by about 15%. Mortalities also occurred in the 1/10 LD50 group after 10 days. Some decrease in egg-laying and fertilization rates was noted in the group given 1/50 LD50 per day, but the difference when compared to the control group did not appear significant.

72-1751. Batterton, J. C.; Boush, G. M.; Matsumura, F. (Dept. of Entomology, U. of Wisconsin, Madison, WI 53706). **DDT: inhibition of sodium chloride tolerance by the blue-green alga *Anacystis nidulans.*** *Science 176(4039): 1141-1143; 1972.* (14 references)

Anacystis nidulans, a freshwater blue-green alga, has been found to tolerate sodium chloride (1% by weight) and DDT [1,1,1-trichloro-2,2-bis-(*p*-chlorophenyl)ethane] (800 ppb) separately, but growth was inhibited in the presence of both compounds. This inhibition was reversed by an increased calcium concentration. It is possible that inhibition of (Na^+,K^+)-activated adenosine triphosphatase by DDT causes this species to lose the ability to tolerate sodium chloride. (Author abstract by permission. Copyright 1972 by the American Association for the Advancement of Science)

72-1752. Wright, S. J. L.; Forey, A. (School of Biological Sciences, U. of Bath, Claverton Down, Bath BA2 7AY, England). **Metabolism of the herbicide barban by soil *Penicillium.*** *Soil Biol. Biochem. 4(2): 207-213; 1972.*

Barban was metabolized by *Penicillium jenseni*, isolated from treated soil, via 3-chloroaniline. The organism was unable to grow using barban or 3-chloroaniline as the sole source of carbon; however, in the presence of a malt extract there was visible growth and 3-chloroaniline was produced and subsequently completely utilized. The enzyme, probably an amidase, was found to be associated with the mycelial wall and was inhibited by *p*-chlorophenyl *N*-methylcarbamate. Other *Penicillia*, isolated from untreated soil, were found to have the capacity to metabolize barban, particularly when the mycelium was grown in the presence of barban.

72-1753. Bosik, J. J. (U. of Maryland, College Park, MD). **Metabolism of C-2307 (dimethyl phosphate, ester with 3-hydroxy-*N*-methoxy-*N*-methyl-*cis*-crotonamide) in rats.** *Diss. Abstr. Int. 32(6): 3415B; 1971.*

The synthesis of C-2307-^{32}P and C-2307-^{14}C, their metabolism in rats, and the biological activity of C-2307 was studied. C-2307 was more toxic to houseflies, German cockroaches and white mice than its dimethyl amide analog, dicrotophos. In addition, C-2307 was synergized less by sesamex than was dicrotophos. Phenobarbital pretreatment reduced the toxicity of C-2307 to a lesser extent than for dicrotophos. Neutral phosphate ester metabolites of both the C-2307-^{32}P and the C-2307-^{14}C-labeled compounds excreted from treated rats were isolated and identified. Approximately 90% of the total administered radioactive C-2307-^{32}P dose was recovered in the rat urine 72 hours after treatment. With the C-2307-^{14}C-labeled compound, 67% of the administered dose was recovered after 72 hours. In both studies, C-2307 was *N*-dealkylated to its unsubstituted amide analog. Only one intermediate, thought to be the *N*-hydroxy-*N*-methyl derivative, was detected in the C-2307-^{32}P study. This metabolite was not detected in the C-2307-^{14}C study. Neither the des-*N*-methoxy nor the des-*N*-methyl analogs of C-2307 was detected in the rat urine. The data indicate that the *N*-methoxyamide moiety of C-2307 plays a critical role in the compound's toxicity and subsequent metabolism. (Author abstract by permission. Copies of the thesis are available from University Microfilms, Order No. 72-620).

72-1754. Epifanio, C. E. (Duke U., Durham, NC). **The effects of dieldrin on the development of two species of crabs.** *Diss. Abstr. Int. 32(6): 3702B; 1971.*

Some of the effects of dieldrin on the development of two species of crabs, *Leptodius floridanus* and

Panopeus herbstii, were studied. It was found that the larvae of neither species were able to complete their development of 10 ppb dieldrin or higher in sea water. Groups of *Leptodius* larvae reared in 1 ppb dieldrin in sea water had a 15% to 27% higher mortality in development to the post-larval stage than controls. The highest mortality occurred during the first zoeal stage. The time of development to the megalopal stage was as much as 11.4% longer among larvae reared in 1 ppb than among controls. The survival of *Panopeus* larvae to the first crab stage was not affected by 1 ppb dieldrin in sea water of 28.5 salinity. Stress conditions of salinity-temperature considerably increased the toxicity of 1 ppb dieldrin to *Panopeus* larvae. *Leptodius* larvae were fed dieldrin-contaminated food throughout the period of larval development. Significant increases in mortality were found only when the food contained higher that 12 ppm dieldrin (dry weight). No larvae were able to complete their development when fed food containing 33 ppm dieldrin. The time of development to the megalopal stage was 14.8% longer in larvae fed 18 ppm dieldrin than in controls. Zooplankton were collected from Onslow Bay during the summer of 1970. Concentrations of dieldrin in the zooplankton ranged from 0.020 ppm (dry weight) to 0.039 ppm (dry weight). It was concluded that concentrations of dieldrin in natural food sources of crab larvae are not presently high enough to affect the development of the larvae. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 72-315)

72-1755. Cordes, C. L. (North Carolina State U., Raleigh, NC). **Comparative study of the uptake, storage, and loss of DDT in small mammals.** *Diss. Abstr. Int. 32(11): 6351B; 1972.*

The uptake, storage and loss of DDT in laboratory *Mus musculus* of two strains and in wild-caught *M. musculus, Peromyscus maniculatus,* and *Ochrotomys nuttalli* was investigated by measuring residues in body lipids, urine, and feces after short-term exposure to DDT-treated diets. For specimens of *Peromyscus leucopus*, gas-liquid chromatography determinations were generally lower than those by liquid scintillation by a three-fold factor. *P. maniculatus* and laboratory *M. musculus* stored significantly higher residue levels than *p. leucopus*. Unaltered DDT represented a significantly greater proportion of the total residues stored by *P. leucopus* than by laboratory *M. musculus. P. leucopus* showed a higher proportion of measured residues excreted in the feces in comparison to laboratory and wild-caught *M. musculus*, *P. maniculatus*, and *O. nuttalli*. Evidence suggested that an important water-soluble metabolite in the feces was not monitored. The fecal route of residue elimination may be important in the greater ability of *P. leucopus* to tolerate high dietary levels of DDT. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 72-15,897.)

72-1756. Zatz, J. L. (College of Pharmacy, Rutgers U., New Brunswick, NJ 08903). **Accumulation of organochlorine pesticides in man.** *J. Pharm. Sci. 61(6): 948-949; 1972.* (8 references)

Pharmacokinetic relationships were used to quantitate the possible accumulation of DDT and dieldrin in man. Biological half-life values were based on data in the literature. The results indicated that once equilibrium is achieved after repeated dosing, levels of DDT in human fat rise to 500 times that following a single dose. Dieldrin under the same conditions reaches an accumulation 1600 times that following a single dose.

72-1757. Kenney, A. D.; Dacke, C. G.; Wagstaff, D. J.; Musacchia, X. J.; Volkert, W. A. (Depts. of Pharmacology, Veterinary Physiology and Pharmacology, Physiology, and Radiology, and Space Sciences Research Center, U. of Missouri, Columbia, MO 65201). **Effects of DDT on calcium metabolism in the Japanese quail.** *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo. 1972, pp. 247-255.* (20 references)

After being fed DDT in their diet, Japanese quail showed a decrease in eggshell production and in eggshell thickness. A bell-shaped dose-response curve, not previously reported was found. A marked increase in blood pCO_2 was observed at the 3 ppm DDT level in birds having no calcified egg in their oviducts. No significant effects were observed at higher levels or in birds in which a calcified egg was present. There were no changes in liver oxidative enzymes, which had been isolated from treated birds and determined by using EPN and *p*-nitroanisole as substrates. In general, the data obtained support the carbonic anhydrase theory of eggshell thinning.

72-1758. Davidson, K. L.; Sell, J. L. (U. S. Dept. of Agriculture, Animal Science Research Div., ARS, Metabolism and Radiation Research Lab. and Dept. of Animal Science, North Dakota State U., Fargo, ND 58102). **Dieldrin and *p,p'*-DDT effects on eggshell characteristics in chickens.** *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo., 1972, pp.257-265.* (21 references)

In a well-controlled experiment, Leghorn chickens were given diets containing 100 and 200 ppm *p,p'*-DDT or 10 and 20 ppm dieldrin for 12 wk. No thinning in eggshells was noted and the insecticides did not affect average egg production per bird, egg weight, dry shell weight, shell calcium, length of clutch or number of clutches, and brain, liver and thyroid size of the hens. Egg weight increased and eggshell thickness decreased in all groups as the experiments progressed. Dieldrin appeared to increase eggshell thickness in eggs collected at biweekly intervals but this was attributed to chance

since the lower dose gave the larger increase and eggs collected in clutches revealed no differences among treatments.

72-1759. Ueyama, A.; Egawa, H.; Masuko, M.; Shikata, H. (Pesticides Research Inst., Kyoto U., Kyoto 606, Japan). **Factors affecting the absorption of BHC-isomers by the fungal mycelium.** *Nippon Kingakkai Kaiho (Trans. Mycol. Soc. Jap.) 12: 103-107; 1971.* (3 references)

A laboratory investigation of the absorption of BHC by fungal mycelium indicated that γ- and δ-BHC are absorbed in higher quantities by *Fusarium roseum* than α- and β-BHC. In an experiment with *Cochliobolus miyabeanus* γ-BHC was absorbed up to a level of 1 μg/mg for fresh mycelium. Fourteen successive exposures of the same mycelium of *F. roseum* to a constant concentration of BHC resulted in a decrease in the amount taken up by the 12th treatment with a maximum uptake of 0.54 μg/mg for fresh mycelium. Mixed results were obtained when culture conditions were altered. While more γ-BHC was absorbed in a shaken culture in darkness than in constant light, the reverse was observed in a stationary culture.

72-1760. Taranova, N. P.; Chenykayeva, Ye. Yu.; Kruglova, E. E. (I. P. Pavlov First Med. Inst. Leningrad Dept. of Biochemistry, USSR). **Gangliozidy nervnykh okonchaniy mozga krolikov v norme i pri intoksikatsii fosforoorganicheskim ingibitorom kholinesterazy. [Rabbit brain nerve ending gangliosides in the normal state and during organophosphate cholinesterase inhibitor poisoning conditions.]** *Vop. Med. Khim. 18(1): 25-31; 1972.* (31 references) (Russian)

The synaptosomal fraction isolated from normal rabbit brain homogenates by means of a sucrose gradient fractionation procedure contained 28.7 μg *N*-acetylneuraminic acid or 115 μg gangliosides per mg protein. Administration of a single toxic dose of *O*-*n*-butyl-*S*-*n*-butylmethylthiophosphate i.m. led to a 38% increase in synaptosomal gangliosides of brain homogenates obtained from animals sacrificed upon occurrence of the first poisoning symptoms, 40 min after administration of the cholinesterase inhibitor. At the same time, a 16% drop in whole brain homogenate ganglioside content was observed. TLC on silica gel revealed 10 identical ganglioside fractions in both the synaptosomal fraction and the whole brain homogenate. A clear distinction could be made between three trisialic ganglioside, three disialic ganglioside, and two monosialic ganglioside fractions; two weak spots corresponding to the lowest-polarity fractions with the smallest *N*-acetylneuraminic acid content were less visible. The quantitative relationship between the synaptosomal and whole brain homogenate ganglioside fractions was constant, except for a higher amount in the G_3 fraction, referred to as the main disialoganglioside, occurring in the synaptosomal fraction. The ganglioside fractions remained unaltered in both the whole brain homogenate and the synaptosomal fraction regardless of the considerable enrichment in gangliosides of the latter upon the organophosphate compound-induced cholinesterase inhibition.

72-1761. Naumann, K. (Institut fuer Phytopathologie Aschersleben der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin, Germany). **Veraenderungen in der Zusammensetzung der Bodenbakterienflora nach Einbringung von Pflanzenschutzmitteln in den Boden. [Changes in the composition of the soil microflora following application of plant protection agents to the soil.]** *Zentralbl. Bakteriol. Parasitenk. Infektionskr. Hyg. Abt. II 126(5): 530-544; 1971.* (19 references) (German)

Isolation of bacteria from loam soil treated with methyl parathion, sodium ethyl xanthogenate, vapam, and ethyl alcohol revealed that the proportion of gram-negative bacteria was reduced, while that of the gram-positives was enhanced. A brief increase in motile, gram-negative rods (pseudomonads and others) which occurred 2 weeks after application of methyl parathion, sodium ethyl xanthogenate and vapam was followed by a marked reduction in these species 3 wk later. According to tests on differential media, the numbers of the bacteria with high nutritional requirements (e.g., amino acid and vitamin-demanding forms) rose and fell parallel to the total bacterial count. Soil bacteria with minimal nutrient requirements (autochthonous organisms) were proportionally increased 2 wk after pesticide application, but dropped to a fraction of the total count 5 wk after pesticide treatment.

72-1762. Patyk, S.; Seniow, A. (Dept. of Zoology, U. of Wroclaw, Wroclaw, Poland). **Wplyw insektycydu fosforoorganicznego Z-50 na przebieg doswiadczalnej wlosnicy oraz na obraz surowiczych bialek u krolikow. [Effect of the organophosphate insecticide Z-50 on the course of experimental trichinellosis and serum protein pattern in rabbits.]** *Zesz. Nauk. Wyzsz. Szk. Roln. Wroclawiu. Wet. 26(89): 169-173; 1970.* (6 references) (Polish)

Administration of Z-50 (ronnel) at 41 to 105 mg/kg body weight to rabbits experimentally infected with *Trichinella spiralis* larvae resulted in a decrease in worm infestation. The greatest effect was exerted against unencysted larvae or those in the process of encystment. The observed relative changes in the mean serum albumin level of these rabbits appeared to be dependent upon a considerable increase in the gamma globulin content. The initial rise in α_1 globulin content, followed by a decline toward normal by the 13th day, suggested a nonspecific host reaction. The elevated α_2 globulin level is apparently related to muscle damage and connective tissue reaction. An overall rise in gamma globulin was

noted in all cases. Thus the changes in serum protein pattern appear to be due to trichinellosis alone, and not to the effects of ronnel. (From author abstract)

72-1763. Klotz, H. P.; Thibault, E.; Russo, F. (Service de Nutrition et D'Endocrinologie, Hopital Beaujon, Clichy, France). **L' *o,p'*-DDD a doses faibles dans les spaniomenorrhees anovulatoires des hypertrichosiques. [*o,p'*-DDD in low doses applied in anovulatory spanomenorrhea associated with hypertrichosis.]** *Ann. Endocrinol. 32(6): 763-767; 1971.* (8 references) (French)

In fifteen 20- to 38-yr-old patients with anovulatory spanomenorrhea and hypertrichosis, urinary 17-keto-steroids decreased from an average of 14.9 to 7.0 mg/24 hr following three or six months of treatment with *o,p'*-DDD (TDE) in daily doses of 0.5 to 1.0 g. Menstruation returned to normal in 13 patients, and ovulation was observed in 12 patients. Normal pregnancy occurred in five patients during the treatment period; four of these delivered healthy babies and one (a schizophrenic) required therapeutic abortion. Considerable regression of hypertrichosis occurred in two patients, improvements were observed in seven, and no effect was attained in six patients. The overall results were considered highly satisfactory and were attributed to a decrease in circulating androgens caused by *o,p'*-DDD. The mechanism of action of *o,p'*-DDD is still unknown, and the need for studies concerning its teratogenicity is emphasized.

72-1764. Paleg, L.; Sabine, J. R. (Dept. of Plant Physiology, Waite Agricultural Research Inst., U. of Adelaide, Glen Osmond, S.A. 5064, Australia). **Inhibition by plant growth retardants of cholesterol biosynthesis in slices of rat liver and hepatoma.** *Aust. J. Biol. Sci. 24(6): 1125-1130; 1971.* (11 references)

Cholesterol synthesis by rat liver homogenates and three different Morris hepatomas was inhibited to the same degree by the plant growth retardant Phosfon. In experiments with slices of liver and hepatoma, cholesterol synthesis from [2-^{14}C] mevalonate was found to be inhibited by Phosfon and by Amo 1618. These compounds were also shown to reduce labelled acetate incorporation into long-chain fatty acids as well as into cholesterol.

72-1765. Kuliyeva, A. M.; Rozengart, V. I.; Shmeleva, V. G. (I. P. Pavlov First Med. Inst., Dept. of Biochemistry, Leningrad, USSR). **Nekotorye osobennosti struktury aktivnoy poverkhnosti kholinesterazy zritel'nogo gangliya kal'mara. [Structural features of the active site of cholinesterase from squid optical ganglia.]** *Biokhimiya 36(3): 568-571; 1971.* (12 references) (Russian)

The steric structure of the hydrophobic active site of cholinesterase was studied, using enzyme prepared from squid optical ganglia because of its unusually high susceptibility to organophosphate inhibitors. Organophosphates of the *O*-isoalkyl-*S*-*n*-butylmethylthiophosphate type with branched alkoxy groups of various chain lengths in the phosphoryl moiety were used. Inhibition of SChE activity increased with increasing *O*-alkyl chain length; the isohexyl derivative produced maximum enzyme inhibition. These and other published data confirmed the assumption that the hydrocarbon segment of the inhibitor is sorbed at the hydrophobic region of the active site of SChE. This hydrophobic region, corresponding in length to one *n*-heptyl chain length, consists of two segments, one complementary to an isohexyl and the other complementary to a normal chain structure.

72-1766. Brestkin, A. P.; Parkhomenko, T. Y. (I. M. Sechenov Inst. of Evolutional Physiology and Biochemistry of the USSR Acad. of Sciences, Leningrad, USSR). **Substratnaya spetsifichnost chastichno ochishchennoy kholinesterazy syvorotki krovi kur. [Substrate specificity of partially purified chicken serum cholinesterase.]** *Biokhimiya 36(5): 950-955; 1971.* (15 references) (Russian)

Identification and substrate specificity studies of chicken serum cholinesterase were performed on partially purified enzyme preparations obtained by ammonium sulfate fractionation procedures. Results obtained using two specific organophosphate inhibitors, GD-42 (methyl-sulfomethylate-*O*-ethyl-*S*-(*c*-ethylmercaptoethyl) methylthiophosphonate) and DFP (diisopropylfluorophosphate) and application to a series of substrates, including a wide variety of choline esters, indicated that the preparation obtained contained only a single enzyme. The choline esters used appeared to be arranged as follows, in decreasing order of hydrolyzability by the enzyme: propionylcholine, acetylcholine, butyrylcholine and acetyl-β-methylcholine, indicating that the enzyme under study was a propionylcholinesterase. The catalytic activity of this propionylcholinesterase was inhibited by large amounts of propionylcholine, butyrylcholine and acetyl-β-methylcholine and unaltered by acetylcholine. The activity of the catalytic site of the propionylcholinesterase toward acetylcholine chloride appeared to be ten times lower than the activity of bull erythrocyte acetylcholinesterase, and twice as low as the activity of horse serum butyryl cholinesterase.

72-1767. Komissarenko; V. P.; Turchyn, I. S.; Onyshchenko, D. S.; Prokopchuk, V. O. (Kiev Research Inst. of Endocrinology and Metabolism, USSR). **Tsytokhimichne dislidzhennya lipidiv ta aktyvnosti suktsyndehidrohenazy i tsytokhromoksydazy v klitynnykh kul'turakh hadnyakovykh zaloz i nyrok pid vplyvom khlodytanu (*o,p'*-DDD). [Cytochemical studies on lipids, and succinyl dehydrogenase and cytochrome oxidase**

activities in kidney and adrenal cell cultures exposed to chlodithane (*o,p'*-DDD).] *Dopov. Akad. Nauk Ukr. RSR, Ser. B., 33(11): 1025-1028; 1971.* (9 references) (Ukrainian)

Chlodithane (TDE) has been used in the treatment of certain functional disorders of the adrenal cortex. Cytochemical studies were performed on human fetal and new born dog adrenal and kidney cell cultures and on rabbit and guinea pig kidney cultures following exposure to TDE *in vitro*. Dose-dependent cytotoxic effects were observed 48 hours after addition of dilute alcohol solutions of TDE to 4- to 6-day-old trypsinized cell cultures. Poorly-staining sudanophilic inclusions in both kidney and adrenal cells were observed only in the perinuclear cytoplasm two hr after addition of the compound, and were associated with increased enzyme activity, especially in kidney fibroblast and epithelial cells. Degeneration of secretory cells was associated with complete absence of lipids in the cytoplasm, whereas degeneration of the other cells observed (adrenal and kidney fibroblasts and kidney epithelial calls) was associated with increased numbers of sudanophilic inclusions and occurred 96 hr after the beginning of the experiment. Enzyme activity was most severely reduced in secretory cells, which thus seem to take up the largest amounts of TDE.

72-1768. Gorshkov, A. I. (I.M. Sechenov First Medical Inst., Moscow, USSR). **Gigiyenicheskaya otsenka khlorkholinkhlorida (preparata CCC) i yego kombinatsii s aminnoy sol'yu 2,4-D. [Hygienic evaluation of chlorocholine chloride (CCC) and of its combination with 2,4-D amine salt.]** *Gig. Sanit. 36(11): 33-36; 1971.* (3 references) (Russian)

The acute LD50 of CCC (chlormequat chloride) was found to be 680 and 600 mg/kg for male and female rats respectively, and the acute LD50 of 2,4-D amine salt was 855 and 625 mg/kg respectively. A mixture of the two compounds had an acute LD50 of 890 mg/kg in female mice. Subacute toxicity experiments, involving the peroral administration of one-sixth LD50 of the 2,4-D derivative per day for 72 days to rats and one-twentieth LD50 for the same time period to rabbits indicated a cumulative tendency in rats. Cholesterol levels were reduced in all treated groups. Liver tissue damage and alterations in spermatogenesis were seen in animals receiving the 2,4-D salt, alone or in combination, whereas no morphological damage was noted in the internal organs of animals treated with CCC alone. In chronic toxicity tests comprising treatment for 9 months with CCC at 1.6 or 4.0 mg/kg, or with a combination of CCC plus 2,4-D at 2 + 25 or 0.8 + 10 mg/kg respectively, serum cholesterol was reduced and β-lipoprotein and serum oxidase levels elevated in the higher-dose combination-treated group. The spleen weight was 23% higher and the adrenal weight 22% lower in the animals in the higher-dosage CCC group.

72-1769. Krasyuk, N. N. (Moscow Inst. for Meat and Dairy Product Technology, USSR). **Issledovaniye metabolizma granozana v organizme laboratornykh zhivotnykh pri peroral'nom vvedenii. [Metabolism of perorally administered granosan in laboratory animals.]** *Gig. Sanit. 37(2): 114-115; 1972.* (Russian)

The distribution and fate of granosan (ethyl mercury chloride) in Wistar rats were studied following a single p.o. administration of a 203Hg-labelled product at 3.0 μC/rat. Most of the product, was eliminated via the gastrointestinal tract 24-72 hr post ingestion. Maximum GI absorption of labelled Hg occurred during the first 48 hr after administration, and did not exceed 6.0% of the initial activity as determined in the gastric, small and large intestine walls. Upon reaching the bloodstream the isotope appeared to be rapidly and uniformly distributed among organs and tissues at about 0.1% of its initial activity. Redistribution of initial activity was observed later, reaching a maximum of 2.6% in the kidney between 12 and 96 hr after administration, and decreasing to 0.1% 720 hr after treatment. Accumulation of labelled Hg in blood, heart, lungs, spleen, liver, gonads, brain and skeletal muscles never exceeded 0.5%/g of the initial dose per gram of tissue. The kidney is thought to be the target organ for ethyl mercury chloride.

72-1770. Baynova, A.; Zlateva, M.; Y"lcheva, Vl. (Unified Scientific Research Inst. of Hygiene and Occupational Safety, Sofia, Bulgaria). **Khronichna inkhalatorna toksichnost na dipiridiliumnite kherbitsidi. [Chronic inhalant toxicity of dipyridilium herbicides.]** *Khig. Zdraveopazvane 15(1): 25-31; 1972.* (9 references) (Bulgarian)

Chronic toxicity of Reglon (diquat) (1.90 and 0.32 mg/m^3) and gramoxone (paraquat) (1.10 and 0.05 mg/m^3) in white rats was studied following four hr of inhalational exposure daily, six days/wk, for four to five months. Both herbicides produced leukopenia and decreased erythrocytic peroxidase activity, but had no effect on serum or leukocyte catalase activity when used in high doses. Paraquat (1.10 mg/m^3) produced inflammatory alterations of the respiratory tract associated with increased β-glucuronidase activity in the peribronchial connective tissue and in the interstitial cells, increased LDH activity in the bronchial epithelium and correspondingly decreased succinyl dehydrogenase activity. Acid phosphatase activity was increased, and alkaline phosphatase activity inhibited throughout the respiratory system. Parenchymal dystrophy and hepatocytic hyperplasia occurred, but no decrease in hepatocytic cytoplasm glycogen; no differences in liver enzyme activity were observed in comparison to controls. Partial proteic dystrophy of the kidney associated with cell necrosis was observed at times. Diquat given at 1.90 mg/m^3 produced no alterations in LDH, NAD-diaphorase, and alkaline or acid phosphatase levels. Increased β-glucuronidase levels were evident in the interstitial cells

of the respiratory tract. The low doses of the herbicides used produced no damage.

72-1771. Nikolayev, A. I.; Usmanova, I. Ya. (Tashkent Med. Inst. USSR). **O vyyavlenii antitel k pestitsidam. [Production of antibodies to pesticides.]** *Lab. Delo 11: 676-678; 1971.* (10 references) (Russian)

The production of antibodies to methylmercaptophos and hexachlorane (BHC) was studied in rabbits following peroral administration of the compounds for 14 days. Pesticide-serum conjugates prepared with healthy rabbit serum were used as test antigens. Antibodies were first observed in pesticide-treated rabbit serum on the sixth day of treatment, and reached maximum titers on the tenth and 14th days of treatment. The formation of antibodies against the organochlorine compound appeared to be more intense than against the organophosphate. No antibodies to either compound were detected three months after the beginning of the experiment. Clinical observations on 102 patients occupationally exposed to pesticides for more than three years revealed the presence of antibodies in 65 cases. Antibodies against DDT and BHC were found more frequently than those against organophosphates, and were absent when determined six months after discontinuation of exposure. Serological tests should provide additional means for the diagnosis of pesticide poisoning.

72-1772. Adamczyk, E. (Katedra Higieny Produktow Zwierzecych Wydzialu WSR, Wroclaw, Poland). **Translokacja DDT w organizme kur pod wplywem glodu. [Translocation of DDT in the chicken under the influence of starvation.]** *Med. Wet. 27(2): 103-105; 1971.* (10 references) (Polish)

The accumulation and fate of DDT, as affected by starvation, were studied in leghorn chickens following a single peroral administration of DDT to give 400 ppm in the body. One group of chickens received food at lib. The second received no food during the first five days following pesticide administration, after which they were given a total of 10% of the food given to the first group until the end of the experimental period. DDT levels ranged from 44 to 228 ppm in the adipose depot tissues, increasing from the first through the 20th day after administration. The pesticide was first detected in muscle, liver, and brain samples along with its metabolite, DDE, on the second day after the beginning of the experiment. DDE levels in brain samples were twice as high in starved as in fed hens at the end of the experimental period. DDE levels were proportional (10-25%) to the DDT amounts found in muscle, liver, and brain. It was assumed that migration of DDT from the adipose depot tissues occurred during the first days of the experimental period in starving hens. No clinical poisoning symptoms were observed in either group, and DDT levels exceeding 200 ppm in adipose tissue produced no clinical symptoms.

72-1773. Kamata, T. (School of Hygiene, Faculty of Medicine, Hiroshima U., Hiroshima-shi, Japan). **[Hygienic studies on pesticide residues. I. Distribution, storage and urinary excretion of BHC (α-, β-, γ- and δ-isomers) in the rat after peroral administration.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 26(4): 358-364; 1971.* (14 references) (Japanese)

Although BHC was banned in Japan in November, 1970, BHC isomers are still widely distributed in farm products as well as in human tissues because of extensive prior use. The results of experiments on the accumulation of the four BHC isomers (α-, β-, γ- and δ-BHC) in rat tissues and urinary excretion following oral administration are presented. Each isomer, in pure form, was administered as a solution in acetone-olive oil to male Wistar rats by stomach tube at 50 mg/kg/day for seven days. Blood, liver and kidney samples were analyzed for BHC, 7 and 14 days after the beginning of administration; urine samples were taken every 24 hr from rats given a single dose of 50 mg of each isomer. The order of accumulation of the isomers was $\beta > \alpha > \gamma > \delta$; the order of isomer excretion in the urine was $\alpha > \gamma > \delta > \beta$, and the duration of excretion of each isomer was $\beta > \alpha > \gamma > \delta$. The β-isomer was found not only in the livers of rats given this isomer, but also in the livers of rats given only the other three isomers, indicating isomerization to the β-isomer.

72-1774. Sassa, S.; Granick, S. (Rockefeller U., New York, NY 10021). **Induction of δ-aminolevulinic acid synthetase in chick embryo liver cells in culture.** *Proc. Nat. Acad. Sci. USA 67(2): 517-522; 1970.* (15 references)

Experimental results suggesting that certain compounds induce δ-aminolevulinic acid (ALA)-synthetase synthesis by affecting the transcriptional process and others by affecting the translational process are reported. Allylisopropylacetamide (AIA) was found to increase ALA-synthetase activity about ten-fold over a 14-hr period. Following removal of AIA and addition of a protein synthesis blocking agent, the half-life of the ALA-synthetase was three hr, as it had been before induction, and remained at three hr when inducers were added. AIA and lindane were found to enhance the activity of ALA-synthetase at the translational level. Etiocholanolone and 3,5-dicarbethoxy-1,4-dihydrocollidine induced activity at the level of transcription.

72-1775. Jain, M. K.; Marks, R. H. L.; Cordes, E. H. (Dept. of Chemistry, Indiana U., Bloomington, IN 47401). **Kinetic model of conduction changes across excitable membranes.** *Proc. Nat. Acad. Sci. (USA) 67(2): 799-806; 1970.* (34 references)

The proposed kinetic model describes conduction changes across excitable membranes and central aspects of excitable membrane behavior including effects of inhibitors. The model is based on the assumption that a

population of discrete membrane loci is distributed among several functional states and that this distribution is determined by the voltage across the membrane. The states are interconverted through a series of first order reactions. Inhibitors such as DDT decrease the rate constant for the transition from state B (specifically Na-conducting) to state C (specifically K-conducting).

72-1776. Mestres, R.; Illes, S. (Laboratoire de Chimie appliquee a l'expertise Faculte de Pharmacie, Montpellier, France). **Experience de fixation de plastifiants chlores par des poissons. [Chlorinated plasticizer fixation by fish.]** *Trav. Soc. Pharm. Montpellier 31(3): 237-244; 1971.* (8 references) (French)

Experiments were performed to determine DDE and residual DDT in redfish (*Carassius vulgaris*) following acute poisoning, and to study the accumulation of pentachlorobiphenyl released by plastic bags in river waters. DDT added to water in doses of 10.0, 1.0, and 0.1 mg/l under laboratory conditions resulted in accumulation of 18.1 mg/kg total DDT in the dead fish, of which 12.8 mg/kg had been metabolized to DDE at the highest dosage. The two lower doses led to the accumulation of (4.0 mg/kg and 1.5 mg/kg of total DDT and DDE respectively. About 90% of the DDT added to the water was still present in its original form at the end of the experiment, and most of the remainder as DDE. In parallel tests performed with DDE added to water in similar concentrations, fish survived for 6, 24, and 13 days respectively, and accumulated 20-22 mg/kg at the two highest concentrations and 0.8-2.0 mg/kg at the lowest DDE level. The second part of the study revealed rapid release of pentachlorobiphenyl into water and elevated PCB levels in fish when such bags were present in water. Pentachlorobiphenyl was not transformed in fish tissues and its levels showed an eight-fold daily increase in the fish as compared to the water. After seven months, the fish contained 1500 times more pentachlorobiphenyl than the surrounding water.

See also **72-1591** **72-1594** **72-1598** **72-1603** **72-1617** **72-1679** **72-1689** **72-1782**

72-1777. Glotfelty, D. E. (Soil and Water Conservation Research Div., U.S. Soils Lab., U.S. Dept. of Agriculture, Beltsville, MD 20705). **Identification of organochlorine pesticide residues by ultraviolet solid-phase photolysis.** *Anal. Chem. 44(7): 1250-1254; 1972.* (6 references)

A simple, rapid method for the identification of nanogram quantities of organochlorine insecticide residues in soil, water, and plant extracts is given. The electron-capture gas chromatographic degradation patterns obtained by photolysis of thin films with a germicidal lamp were reported by relative retention times on a 10% DC-200-15% QF 1 column. By multiple determinations, the patterns were found to be qualitatively reproducible and very little affected by varying reaction conditions such as insecticide concentration and coextracted impurities. Some comparisons were also made with patterns produced by liquid-phase photolysis, and it was felt that the techniques were complementary. (Author abstract reprinted by permission of the American Chemical Society)

72-1778. Giang, P. A. (Entomology Research Div., ARS, U.S. Dept. of Agriculture, Beltsville, MD 20705). **Sandwich KBr disk for scanning volatile pesticides.** *Anal. Chem. 44(7): 1340-1342; 1972.* (1 reference)

A difficulty often encountered in the infrared analysis of volatile pesticides is the evaporation of the pesticides before the entire spectrum is scanned. This problem can be circumvented by preparing a special KBr disk. Using a miniature press, 300 mg of KBr is first compressed into a hard, transparent disk (25-30 lb pressure applied to the press bolt with a torque wrench). Then a small, shallow depression, 2 to 3 mm in diameter is scratched into the disk. The pesticide sample is mixed in a micromortar with the KBr scratched out of the disk, and the mixture again placed into the depression. The whole disk is covered with another 200 mg of KBr and pressed again. A similar disk without pesticide sample is used in the reference beam. Very small residue quantities (e.g. 8 μg) can be scanned under IR in this manner.

72-1779. Goodwin, E. S.; Matsunaga, A. K.; Piedade, M. F.; Almeida, J.; Amaro, R. G.; Souza Lima, A. A.; Piedade, J. R.; Silva, L. P.; Souza, D. de A.; Yoneda, H. (Chemistry Sect. of the Instituto Biologico, Caixa Postal 7119, Sao Paulo, Brazil). **The analysis of technical grade and formulated malathion.** *Arq. Inst. Biol. (Sao Paulo) 38(2): 51-57; 1971.* (2 references)

Comparative analyses of seven technical grade malathion samples indicated that poor-quality technical malathion could be graded as acceptable when using some of the current methods. Gas-liquid chromatography, apparently the most reliable method, yielded purity values ranging from 75% to 89%. Phosphorus determinations, the WHO colorimetric method, and IR spectrophotometry, all indicated purities in the range of 95%. The copper titrimetric method, which could be developed further, gave values of 81 to 88%. Thin-layer chromatograms of the seven samples revealed the presence of at least three impurities.

72-1780. Gooding, R. H.; Philip, H. G.; Tawfik, M. S. (Dept. of Entomology, U. of Alberta, Edmonton, Alberta, Canada). **DDT-dehydrochlorinase for identification of DDT in soil.** *Bull. Environ. Contam. Toxicol. 7(5): 288-291; 1972.* (3 references)

A procedure was developed for confirming the identity of DDT in soil using the enzymatic conversion of DDT to DDE by DDT-dehydrochlorinase (EC 4.5.1.1) in conjunction with gas chromatography. The partially purified enzyme was prepared from DDT-resistant houseflies; the range of sensitivity was from 0.001 to 10.0 μg DDT. Samples were incubated for 40 min. and the products were extracted into cyclohexane:2-propanol (2:1). This organic extract was concentrated and injected into a gas chromatograph equipped with a tritium foil detector. Results of soil assays indicated that significant amounts of material identified as DDT were not metabolizable by DDT-dehydrochlorinase. A comparison of retention times of the peaks in the material extracted from soil with those of polychlorinated biphenyls (PCB) suggested PCB interference. Addition of known amounts of PCB's to assay samples indicated that although PCB's interfere with the routine gas chromatographic quantitation of DDT, they do not interfere with the enzymatic confirmation of DDT.

72-1781. Uthe, J. F.; Reinke, J.; Gesser, H. (Dept. of the Environment, Fisheries Service, Freshwater Inst., Winnipeg, Manitoba, Canada). **Extraction of organochlorine pesticides from water by porous polyurethane coated with selective absorbent.** *Environ. Lett. 3(2): 117-135; 1972.* (16 references)

The use of cylindrical polyurethane foam plugs as monitors of organochlorine pesticides in waterways was investigated. The plugs were coated with various gas chromatographic liquid phase greases, and tested for absorption and recovery of several organochlorines from standard solutions, water samples and soil suspensions. DC-200, the most effective absorbent, gave recoveries better than 90% for all 10 compounds. Acetone and hexane were used to remove the absorbed pesticide from the foams and glassware, and, after concentration, the sample was analyzed using gas chromatography. A chemical monitor of the type described could have many advantages as a standardized form of water quality monitoring.

72-1782. Curley, A.; Burse, V. W.; Grim, M. E.; Jennings, R. W.; Linder, R. E. (Chamblee Toxicology Lab., Environmental Protection Agency, 4770 Buford Highway, Chamblee, GA 30341). **Polychlorinated biphenyls: distribution and storage in body fluids and tissues of Sherman rats.** *Environ. Res. 4(6): 481-495; 1971.* (40 references)

A method for determining polychlorinated biphenyls (PCB) in blood, urine, feces and tissue of rats is presented, along with data on PCB distribution, storage and excretion. Samples were homogenized, extracted, and applied to a silica gel micro-column in hexane. Eluates were analyzed by electron-capture gas chromatography (GLC) and recoveries were good from all but the urine samples. Of the samples studied, only feces showed no alteration in peak ratios when compared to the standard. Storage of PCB or PCB-derived compounds paralleled the fat content, and was higher than that found for the same dose of DDT. There was no apparent difference in storage by male or female rats.

72-1783. Chau, A. S. Y. (Water Quality Div., Dept. of the Environment, Burlington, Ont., Canada). **Confirmation of pesticide residue identity. I. Derivative formation for the confirmation of photoproducts of endrin: hexachloro- and pentachloro-ketone pesticide residues by gas chromatography.** *J. Ass. Offic. Anal. Chem. 55(3): 519-525; 1972.* (28 references)

Chemical conversions followed by GLC analysis are described for the confirmation of residues of two photoproducts of endrin, ketones I and II, in water and water-borne samples. These endrin degradation products were treated with potassium *tert*-butoxide in *tert*-butanol, followed by subsequent silylation or acetylation to the corresponding silyl ether or acetate. By this procedure, levels as low as 0.02-0.03 ppm of these residues in 25 g fish sample extract or 0.01 ppb in 1 l. water extract can be identified. The use of chromous chloride to confirm these residues is also discussed. GLC data are given for some organochlorinated pesticides and their derivatives on a column of DC-11/QF-1 and OV-101/OV-210. (Author abstract by permission)

72-1784. Nash, R. G.; Harris, W. G. (Plant Science Research Div., ARS, U.S. Dept. of Agriculture, Beltsville, MD 20705). **Soil moisture influence on treatment and extraction of DDT from soils.** *J. Ass. Offic. Anal. Chem. 55(3): 532-536; 1972.* (16 references)

An investigation was conducted to determine techniques which prevented *p,p'*-DDT conversion to *p,p'*-DDE during (a) extraction of highly alkaline soils and (b) DDT treatment of highly alkaline soils. Moistening soils to near field capacity reduced DDT conversion to DDE during treatment and a new column extraction method was developed which prevented further conversion during extraction. Column extraction is more rapid than Soxhlet or shake extraction and requires less expensive equipment. However, column extraction was less efficient: about 4% DDT remained after extraction of incubated soils, whereas only about 1% remained in Soxhlet-extracted soils, except for clay soils in which both methods of extraction were low. Alkaline soils apparently can be extracted safely with either Soxhlet or column extraction without conversion of DDT to DDE, providing the soils have equilibrated in a moist condition. (Author abstract by permission)

72-1785. Dolan, J. W.; Hall, R. C.; Todd, T. M. (Dept. of Entomology, Purdue U., Lafayette, IN 47907). **Selective detection of chlorinated insecticides in the presence of polychlorinated biphenyls.** *J. Ass. Offic. Anal. Chem. 55(3): 537-538; 1972.* (12 references)

A gas chromatographic method for selectively detecting chlorinated insecticides in the presence of polychlorinated biphenyls is reported. A Coulson electrolytic conductivity detector was modified to allow precise control of furnace temperature and hydrogen reaction gas flow. A furnace temperature of 600°C and a hydrogen flow of 1 to 2 ml/min were most advantageous for selective detection of chlorinated insecticides in the presence of polychlorinated biphenyls. (Author abstract by permission)

72-1786. Hanks, A. R.; Engdahl, B. S. (Dept. of Agricultural Analytical Services, Texas A & M U., College Station, TX 77843). **Gas chromatographic determination of Terrachlor in fertilizers.** *J. Ass. Offic. Anal. Chem. 55(3): 657-659; 1972.* (5 references)

A simple and rapid method is described for the determination of Terrachlor (PCNB) in fertilizers. Terrachlor is extracted with chloroform, and aldrin is added as an internal standard. The extract is injected into a gas chromatograph, and peak height ratios are used for quantitative measurement. Analysis of commercial samples gives good precision while analysis of prepared samples gives recoveries ranging from 99.3 to 100.4%. (Author abstract by permission)

72-1787. Lubkowitz, J. A.; Parker, W. C. (Departamento de Quimica Nuclear, Instituto Venezolano de Investigaciones Cientificas, Apartado 1827, Caracas, Venezuela). **The utilization of promethium-147 as an ionization source in electron-capture detectors.** *J. Chromatogr. 62(1): 53-61; 1971.* (11 references)

An electron-capture detector which utilizes promethium-147 as the ionization source has been studied for its use in pesticide analysis. A method has been found to electroplate promethium-147 on gold foils which can be heated to 400° without appreciable loss of activity. The properties of the foil as an ionization source are comparable to those of nickel-63. The detector has been used to analyze pesticides in aqueous media in the range 0.1 to 100 ppb (Author abstract by permission)

72-1788. Takahama, K.; Araki, S.; Kataoka, S.; Matsumoto, K.; Kakihara, Y.; Kanda, M. (Dept. of Legal Medicine, Kumamoto U. Medical School, Kumamoto, Japan). **Bioautography or organomercuric compounds.** *Nippon Hoigaku Zasshi (Jap. J. Leg. Med.) 26(2): 89-92; 1972.* (4 references)

Bioautography has been found to be more sensitive in detecting mercurials than the routine Dithizone method. The combination of the horizontal diffusion method and paper chromatography, with *n*-butanol: pyridine:0.1 *N* ammonia as the developer, was used to determine inhibitors of bacterial growth; linear plots (diameter vs. log. of mercurial quantity) were obtained for the seven compounds tested. The method, however, is not a direct measurement of mercury and could fail to detect toxic mercury compounds showing no bactericidal activity.

72-1789. Khan, M. S.; Hussain, A.; Baig, M. M. H.; Lord, K. A. (Toxicology and Pesticides Lab., Dept. of Plant Protection, Karachi 27, Pakistan). **Assay of methyl parathion and fenitrothion in crop extracts using vapour-phase separation in conjunction with gas chromatography.** *Pak. J. Sci. Ind. Res. 14(4-5): 360-363; 1971.* (23 references)

Gas chromatography, used for separating methyl parathion and fenitrothion, was employed in conjunction with a vapor-phase clean-up apparatus. This apparatus separated the insecticides from substances extracted from plants that interfered with the gas chromatographic analysis. The apparatus was essentially a heated glass tube through which a stream of hexane vapor was passed and into which the sample was injected. This sample flowed down the slope of the tube and a new surface was continuously developed from which the pesticides were vaporized and then swept into a condenser by the hexane gas carrier; the nonvolatile substances remained behind. The gas chromatograph was fitted with a coiled stainless steel preconditioned column, packed with 5% DC-200 on Celite, and an electron-capture detector operating at 180°. Pure nitrogen was used as a carrier gas flowing at the rate of 40 ml/min. Both compounds could be detected at 1 ppm in the six crops tested and at 0.1 ppm in four of the crops.

72-1790. Khan, M. S.; Hussain, A.; Lord, K. A. (Toxicology and Pesticides Lab., Dept. of Plant Protection, Karachi 27, Pakistan). **Comparison of gas chromatography columns for pesticide residue analysis.** *Pak. J. Sci. Ind. Res. 14(4-5): 364-367; 1971.* (15 references)

Organophosphate and organochlorine pesticides were assayed using four different stationary phases; in all cases the support was Celite 60-80 mesh. The stationary phases used were 15% QF-1, 10% DC-200, equal amounts of support treated with 15% QF-1 and 10% DC-200, and support treated with a mixture of these two liquids prior to coating the support. In general the QF-1 column was more sensitive than the DC-200; the sensitivity of the mixed coating solids was similar to the QF-1 column, whereas that of the mixed liquids was similar to the DC-200. Malathion and fenitrothion could not be resolved by any of the four phases, but could be separated from endosulfan on the DC-200 column. Also endrin and *p,p'*-DDT, not separable on the QF-1 column, were resolved on the other three columns.

72-1791. Qadri, S. S. H. (Dept. of Zoology, P-G Centre, Warangal-1, India). **Estimation of lindane and DDT residues on wheat under storage by bioassay using *Drosophila*.** *Pesticides 6(1): 12-13; 1972.* (14 references)

Wheat treated with lindane and DDT dust formulations was stored under laboratory conditions (24-46°C, 65-80% R.H.) and periodically tested for insecticide content by bioassay using laboratory reared *Drosophila melanogaster*. A plastic vial containing 2 g of wheat was provided with air holes and an opening for the introduction of 20 to 100 flies; the vial was subsequently stoppered with a cotton plug soaked in sucrose solution. Dead flies were counted after 24 hr exposure. Lindane residues declined to 35% of their initial value within 1 wk after application, 25% after 2 wk, and 12% after 3-4 wk. DDT residues remained at 100% within 1 wk after application and declined to 75% at 2 wk, 35% at 3 wk, and approximately 25% at 4 wk. For both these pesticides direct estimates of residues could be made as low as 10 ppm.

72-1792. Thakre, S. K.; Dewan, R. S.; Gulati, K. C. (Dept. of Soil Science and Agricultural Chemistry, College of Agriculture, Parbhani, India). **Micro-determination of DDT in oilseeds.** *Pesticides 6(2): 20-21; 1972.* (4 references)

A procedure developed for the determination of DDT in oilseeds gave recoveries ranging from 90 to 114% in mustard, groundnut, castor and linseed. The procedure involved the following steps: extraction of crushed, fortified samples with *n*-hexane; removal of solvent using propylene glycol as entrapper; alcoholic KOH-hydrolysis of the residue; re-extraction with *n*-hexane; and removal of solvent, followed by a co-distillation technique developed at The Indian Agricultural Research Institute. The DDE produced was measured colorimetrically. The hydrolysis step was essential in breaking up the fat globules and giving reliable recoveries.

72-1793. Keith, L. H.; Alford, A. L. (Environmental Protection Agency, Federal Water Quality Administration, Southeast Water Lab., Athens, GA 30601). **N.M.R. studies of chlorinated polycyclodiene pesticides.** *Anal. Chim. Acta 60(1): 1-11; 1972.* (25 references)

Complete n.m.r. coupling constants for aldrin, dieldrin, isodrin, endrin, and photodieldrin were derived by double, triple, and, where necessary, quadruple resonance studies. Both the normal "W" long-range couplings as well as "non-W". long-range couplings were prevalent. Large paramagnetic shifts were induced by $Eu(DPM)_3$, and plots of the change in chemical shift vs. the reciprocal of the cube of the distance from europium permitted tentative configurational assignment of the

migrated proton in photodieldrin. Transannular, through-space coupling of the migrated proton with the nearby bridgehead proton confirmed this assignment. (Author abstract by permission)

72-1794. Bidleman, T. F.; Nowland, B.; Frei, R. W. (Dept. of Chemistry, Dalhousie U., Halifax, N.S., Canada). **Metallofluorescent indicators as spray reagents for the *in situ* determination of organophosphorus pesticides on thin-layer chromatograms.** *Anal. Chim. Acta 60(1): 13-23; 1972.* (18 references)

Fluorescence-quenched solutions of palladium(II)-calcein and palladium(II)-calcein blue are shown to be sensitive spray reagents for the detection and *in situ* determination of organothiophosphorus insecticides on thin-layer chromatograms. The palladium is displaced from its non-fluorescent indicator complex by the pesticide producing fluorescent spots on the plate. Visual detection limits for 16 insecticides are given. As little as 10-50 ng of phosphorodithioate pesticides can be detected within 1 hr after spraying and drying the plate, while the detection limits for phosphorothioates are somewhat higher (*ca.* 50-100 ng). Quantitative measurements may be conveniently made 18-24 hr after spraying and drying the plate. Plots of fluorescence (as peak area) vs. quantity of pesticide are linear over a 10-15 fold range. The relative standard deviation of replicate spots of Guthion (50-400 ng) and Cygon (dimethoate) (50-100 ng) is 4-9% and less than 15% for 10 ng of Cygon or 20 ng of Guthion. The method was applied to the analysis of lake water spiked with Cygon. The recovery of 2-20 $\mu g/\Gamma^1$ of the pesticide was 87-113% with no clean-up other than t.l.c. required. (Author abstract by permission)

72-1795. Daenens, P. (Farmaceutisch Institut, Laboratorium voor Toxicologie, 3000 Leuven, Belgium). **Das Paranitroanisol, ein Detoxikationsmetabolit bei der Parathion-(E 605)-Vergiftung. [Paranitroanisole, a detoxication metabolite in parathion (E 605) poisoning.]** *Beitr. Gerichtl. Med. 27: 199-202; 1970.* (German)

A procedure frequently used for determination of parathion in tissue specimens involves steam distillation in a slightly acid milieu. For confirmation, the distillate can be subjected to alkaline hydrolysis, yielding *p*-nitrophenol, which turns the distillate yellow. After acidification, the *p*-nitrophenol can be extracted quantitatively with ether. When this procedure was carried out on a urine specimen obtained from an accidental poisoning case, a compound was detected in the ether extract which gave an absorption maximum at 290 nm in *n*-hexane and at 300 nm in neutral and ammoniated ethanol. Thus the substance was one which could no longer tautomerize in alkaline solution, and whose phenolic function was blocked. Its absorption spectrum in three solvents was identical to that of pure *p*-nitroanisole, and its *Rf* values were identical to that of *p*-nitroanisole during TLC with two solvent systems. It has not been determined whether the *p*-nitroanisole might represent a contaminant of the ingested parathion rather than a true metabolite.

72-1796. Hattula, M. L.; Karlog, O. (Hydrobiological Inst. of Tyvaeskylae, Tyvaeskylae, Finland). **Adsorption of polychlorinated biphenyls (PCB) on glass surfaces.** *Dan. Tidsskr. Farm. 45(7): 259-261; 1971.* (4 references)

Polychlorinated biphenyls (PCB) were shown to be adsorbed on glass surfaces, particularly on old glassware, resulting in recoveries as low as 11%. Adsorption was minimum when PCB's were stored in aluminum containers. Recoveries during analytical procedures were improved by saturating glass containers with PCB's and coating them with silicone.

72-1797. Ghezzo, F.; Magos, L. (Medical Research Council Labs., Toxicology Unit, Woodmanstern Road, Carshalton, Surrey, England). **Application of carbon disulfide evolution method for the differentiation of bisdithiocarbamates from methyldithiocarbamates.** *Pestic. Sci. 2(6): 249-250; 1971.* (5 references)

Using two different hydrolyzing media, sulfuric acid and acetic acid, the CS_2 evolution method is suitable for the group identification of dithiocarbamate fungicides. In contrast to the metal salts of dimethyldithiocarbamates and tetramethylthiuramidsulfide, bisdithiocarbamate compounds release significantly less CS_2 in the presence of acetic acid than in the presence of sulfuric acid. (Author abstract by permission)

72-1798. Frehse, H. (Pflanzenschutz Anwendungstechnische Abteilung, Biologische Forschung, Farbenfabriken Bayer AG, Leverkusen, Germany). **On the analysis of organophosphorus pesticide residues.** *Pflanzenschutz-Nachr. 23(3): 196-207; 1970.* (41 references)

Techniques used in analyzing organophosphate residues are reviewed. Multidetection procedures and those not involving routine analysis are excluded. Analytic methods for the following classes of compounds are included: parathion and related compounds; *N*-heterocyclic phosphates; thioether phosphates; monothiophosphates; carboxylic amide- or ester-containing compounds; and other compounds such as dichlorvos and coumaphos.

72-1799. Czarnowski, W. (Katedra Chemii Toksykologicznej i Sadowej, Akademii Medycznej w Gdansku, Gdansk, Poland). **Proba oznaczania DDT i jego pochodnych w moczu metoda miareczkowania amperometrycznego. [Studies on the determination of DDT and its derivatives in urine by amperometric titration.]** *Gdansk. Tow. Nauk. Rozpr. Wydz. III 8: 57-63; 1971.* (10 references) (Polish)

The increasing use of plant protection agents had increased the need for reliable methods of detecting their presence, especially in cases involving occupational contact. A method has been developed for amperometric assay of organochlorine pesticides in urine. At present, it only permits the determination of the original pesticide plus its metabolites. The organochlorine is continuously extracted from urine with ethyl ether. The ether extract is then placed on filter paper, which is subsequently burned over a platinum catalyst to liberate chlorine. The chloride ion is assayed by titration with silver nitrate; the end point of the titration is indicated amperometrically. Apparatus suitable for measuring the current intensity is described.

72-1800. Bailey, D. R. (Agriculture Branch, Queensland Dept. of Primary Industries, South Johnstone Research Station, Queensland, Australia). **Comparison of oats and *Lemna oligorrhiza* for diuron assay.** *Queensl. J. of Agr. Anim. Sci. 27(4): 395-400; 1970.* (9 references)

Three bioassays for determination of diuron in soil were compared using soil samples of alluvial silty clay-loam from several depths. Shoot weights were significantly reduced by 4 and 8 ppm of diuron, averaged over all varieties of oats tested in soil from the 0- to 6-in. layer, although only the Fulghum variety showed a significant reduction at 4 ppm. A rapid bioassay, similar to that of Parker's, using thin duckweed (*Lemna oligorrhiza*) scored for paraquat damage was capable of detecting diuron at 2 ppm in five out of eight tests. Dry shoot weight of Italian ryegrass was also more sensitive to diuron than oat shoot weight but was difficult to grow satisfactorily. In the 18- to 24-in. layer all three plants detected diuron at 0.25 ppm and thin duckweed and Italian ryegrass were sensitive to 0.125 ppm. The thin duckweed assay was not only the most sensitive but could be completed for four days instead of the four to five weeks required for the oat assay. Organic matter in soil from the surface layer may have rendered the diuron unavailable to the plants.

72-1801. Murano, A.; Umeda, I.; Oba, S. (Takarazuka Lab., Sumitomo Chemical Co., Ltd., Takarazuka-shi, Hyogo-ken, Japan). **[Analytical studies on pesticides and related compounds: XVI. Polarographic determination of pentachlorobenzaldoxime.]** *Bunseki Kagaku (Jap. Anal.) 21(5): 644-648; 1972.* (17 references) (Japanese)

The fungicide pentachlorobenzaldoxime (Minokol) and its formulations were quantitatively determined by a combination of thin-layer chromatography (TLC) and polarography. Minokol gave a polarographic reduction wave in acidic media, involving four electrons in the reduction of the oxime to a primary amine. The limiting current was proportional to the concentration in solution thus permitting quantitation. Impurities contained in technical Minokol interfered when the purity was less than 90%, necessitating preliminary purification by TLC.

72-1802. Chattopadhyay, A.; Bennett, L. G. I.; Jervis, R. E. (Dept. of Chemical Engineering and Applied Chemistry, U. of Toronto, Toronto, Ont. Canada). **Activation analysis of environmental pollutants.** *Can. J. Chem. Eng. 50(2): 189-193; 1972.* (33 references)

Neutron and photonuclear, radioactivation techniques were developed to study traces of zinc, mercury, cadmium, arsenic, and lead in soil, vegetation, and human tissue from Holland Marsh area in Canada. Neutron activation was run for 60 hr on samples contained within a sealed polyethylene bag and aluminum foil. Samples were dissolved in an appropriate acid and separation of the radiochemicals was performed by ion exchange column chromatography using Dowex-1, chloride form. Purified metals were precipitated as sulfides or ammonium phosphates and weighed. Gamma rays were used to evaluate the amounts of As, Zn, Cd, and Hg in various samples. Soil samples to be analyzed for lead were irradiated in a linear accelerator and gamma-ray spectra of the resulting samples were recorded using a 40-cc Ge(Li) detector in conjunction with a 4096-channel KICKSORT pulse height analyzer. The method was found to be adequate for determining environmental ppb levels; the error involved was ±10% maximum. The Holland Marsh area was chosen for study because various herbicides and fungicides had been used there. Traces of Zn, Hg, Cd, and As were found in soil and vegetation, with none being found in high levels in humans.

72-1803. Kielczewski, W.; Tomkowiak, J.; Uchman, W. (Katedra Chemii Ogolnej, Wysza Szkola Rolnicza, Poznan, Poland). **Oznaczamie drobnych ilosci pestycydow rteciowych. [Determination of small amounts of mercury pesticides.]** *Chem. Anal. (Warsaw) 16(3): 529-533; 1971.* (3 references) (Polish)

Small amounts of mercury-containing pesticides were determined using silver dithizonate-treated Whatman No. 1 filter paper. Paper slips, 12 × 46 cm, were placed in a chamber containing a 2-mm layer of 0.02% dithizone solution in CCl_4; after impregnation and drying, the paper slips were placed in a 0.01 *N* silver nitrate solution. Excess silver ions were washed off with distilled water and the paper was dried at room temperature for 5 hr in the dark. The paper can be used for several months if kept in a dark container. The resultant violet-colored paper was decolorized by application of a Hg^{2+} containing solution. Quantitation was accomplished by comparing the spots with known standards. The lower limit of detection was 5×10^{-5} mole/l As, Cu, or Zn, at concentrations 10 times that of Hg did not interfere with the reaction. Satisfactory results were obtained with mercurial seed dressings; the compounds were digested with potassium permanganate in sulfuric acid to form Hg^{2+} and the digest was decolorized with oxalic acid prior to the dithizone reaction.

72-1804. Takeshita, R.; Yamashita, T. (Dept. of Public Health Pharmaceutics, The National Public Health, Minato-ku, Tokyo, Japan). **[Detection of chloramphenicol in foods by thin-layer chromatography.]** *Eisei Kagaku (J. Hyg. Chem.) 18(2): 56-60; 1972.* (12 references) (Japanese)

Chloramphenicol (CP) is used in Japan to control leaf blight caused by *Xanthomonas oryzae* in paddy fields. In this method of detection, CP was extracted from foods with acetone, purified on an alumina column, and subjected to thin-layer chromatography (TLC) on silica gel. The solvent system was chloroform:methanol (5:1) with a resultant *Rf* 0.50. The plates were irradiated with uv, sprayed with a 2% methanolic silver nitrate solution and then irradiated again with uv to visualize the spots; the limit of detection was 0.2 μg. When 0.1-1.0 ppm CP had been added to milk, eggs, and chicken, the limits of detection were 0.2, 1, and 0.5 ppm respectively. Organochlorine pesticides such as *p,p'*-DDT, *p,p'*-DDE, aldrin, endrin, and pentachlorophenol (PCP) each had an *Rf* different from that of CP; lindane did not give a colored spot with this method. The *Rf* of PCP (0.55) is nearest to that of CP (0.50); however, PCP was not eluted from the alumina column in the second step of the extraction, therefore it does not interfere with the determination of CP.

72-1805. Tashpulatov, A. Yu.; Ikramov, L. T. (Tashkent Inst. Pharmaceutical Sci. USSR). **Opredeleniye metilmerkaptofosa v biologicheskom materiale. [Determination of methyl mercaptophos in biological matter.]** *Farmatsiya (Moscow) 20(6): 63-66; 1971.* (4 references) (Russian)

Different solvents were tested for the extraction of methyl mercaptophos from human liver. Chloroform was the most efficient solvent giving better yields (45.2% for four extractions at pH 2.0-5.0) than ethanol, benzene, dichloroethane, ethyl ether, petroleum ether, butyl alcohol, or steam distillation with acidified water. The chloroform extract was then digested with concentrated sulfuric and nitric acids. The resultant inorganic phosphate was determined colorimetrically by the addition of ammonium molybdate.

72-1806. Krasnicki, K.; Jaworski, J. (Inst. Inzynierii i Biotechnologii Zywnosci, WSR, Olsztyn, Poland). **Oznaczanie niektorych insektycydow polichlorowych w osadzie czynnym i osadach dennych strumieni metoda chromatografii gazowej. [Determination of some polychlorine insecticides in active sludge and in bottom sediments by means of gas chromatography.]** *Gaz. Woda Tech. Sanit. 46(2): 38-41; 1972.* (34 references) (Polish)

Determination of organochlorines in waste sludge involves three preliminary operations: sulfonation, hexane and petroleum ether extraction, and purification of the resultant extract on Florisil columns. The Florisil extract was then analyzed by gas chromatography. The method was successful in resolving known amounts of lindane, DDT, DDD (TDE), and DDE. However, there were large amounts of materials found with retention time similar to that of aldrin; indicating that further preliminary clean-up is necessary.

72-1807. Druyan, Ye. A. (F. F. Erisman Research Inst. of Hygiene, Moscow, USSR). **Spektrofotometricheskoye opredeleniye trikrezilfosfata i dibutilftalata pri ikh sovmestnom prisutstvii v vozdukhe. [Determination of tricresylphosphate and dibutylphthalate by spectrophotometry in case of their joint presence in the air.]** *Gig. Sanit. 37(2): 100-102; 1972.* (3 references) (Russian)

Two spectrophotometric methods were used for the simultaneous determination of tricresyl phosphate (TOCP) and dibutyl phthalate. Vierordt's equations for two-component mixtures was applied to the values obtained at the absorption maxima in alcohol solutions: 215 nm for TOCP, 10 μg/ml and at 225 nm for dibutyl phthalate, 30 μg/ml. The proportionality between the optical density and concentration was thus ascertained. An alternative procedure utilized the 220 nm wavelength using Vierordt's equation. The technique is sensitive to 1 μg/ml TOCP and dibutyl phthalate; the error being less than 20%.

72-1808. Sinnappa, S.; Thuan, C. E. (Dept. of Chemistry, Petaling Jaya, Malaysia). **Identification of rotenone in fish poisoned by Derris root resin.** *Malaysian Agr. J. 48(1): 20-24; 1971.* (8 references)

A simple technique for detection of rotenone in fish is described which utilizes a TLC analysis for identification of the compound in a direct extract and of its alkaline hydrolysis breakdown products. Fish exposed to *Derris elliptica* root resin until they died were minced and extracted with acetone. Part of the filtered extract was evaporated to dryness, taken up in a minimum amount of acetone and chromatographed on Silica Gel G using isobutyl-methyl ketone as solvent and modified Draggendorff's Reagent 8 for location of the spot. The remaining filtered extract was refluxed with 25% KOH. The products were separated by a series of extractions and chromatographed on Silica Gel G using methanol: acetic acid:ether:benzene (1:18:60:120) as solvent and 1% ferric chloride solution for location of the spots.

72-1809. Batley, G. E.; Dale, L. S. (Author address not given). **Environmental trace analysis.** *Proc. Roy. Aust. Chem. Inst. 39(3): 86-89; 1972.*

Highlights of a one-day symposium concerning trace analysis of environmental samples are presented. Problems requiring attention include maintenance of air and water quality, garbage disposal, liquid trade waste, and sewerage treatment. Some of the newer analytical methods were reviewed at the meeting and the need for

continued work was recognized. The importance of accurate analyses of trace levels of DDT, mercury and other pollutants was emphasized by illustration of the impact of these chemicals on the environment.

72-1810. Aue, W. A.; Teli, P. M.; Gehrke, C. W.; Hastings, C. R. (Missouri Agricultural Experiment Station, U. of Missouri, Columbia, MO). **Collection and analysis of organic air pollutants. In**: *Proc. Univ. Mo. Annu. Conf. Trace Subst. Environ. Health, 5th, June 29-July 1, 1971, Columbia, Mo., 1972, pp. 435-446.* (15 references)

A method is described for collecting pesticides and other organic pollutants from the air. Silicone polymers were chemically bonded to a solid phase such as Chromosorb W, 30/60 mesh, and the resulting material was packed into cartridges made from hulls of commercial charcoal-containing "hydrocarbon traps." Samples were collected by passing a rapid flow of the gas to be monitored through the cartridge using an oilless pump if necessary. Pentane extraction of the sample from the cartridge was followed by suitable GLC analysis. The cartridge provides for collection of sufficient material for several tests and can be used in conjunction with a central analytical laboratory for monitoring a wide area.

See also **72-1624** **72-1632** **72-1639** **72-1655** **72-1709**

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